

REPORT NUMBER 216-GTL-03-004

SAFETY COMPLIANCE TESTING FOR FMVSS NO. 216 ROOF CRUSH RESISTANCE

**GENERAL MOTORS CORPORATION
2003 CHEVROLET TRAILBLAZER, MPV
NHTSA NO. C30107**

**GENERAL TESTING LABORATORIES, INC.
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AUGUST 19, 2003

FINAL REPORT

PREPARED FOR

**U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
SAFETY ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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WASHINGTON, D.C. 20590**

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SECTION 1

PURPOSE OF COMPLIANCE TEST

1.0 PURPOSE OF COMPLIANCE TEST

A 2003 Chevrolet Trailblazer MPV was subjected to Federal Motor Vehicle Safety Standard (FMVSS) No. 216 testing to determine if the vehicle was in compliance with the requirements of the standard. The purpose of this standard is to reduce deaths and injuries due to the crushing of the roof into the occupant compartment in rollover crashes.

1.1 The test vehicle was a 2003 Chevrolet Trailblazer MPV. Nomenclature applicable to the test vehicle are:

A. Vehicle Identification Number: 1GNDDT13SX32213808

B. NHTSA No.: C30107

C. Manufacturer: GENERAL MOTORS CORPORATION

D. Manufacture Date: 11/02

1.2 TEST DATE

The test vehicle was subjected to FMVSS No. 216 testing on July 28, 2003.

SECTION 2

COMPLIANCE TEST RESULTS SUMMARY

2.0 TEST RESULTS

All tests were conducted in accordance with NHTSA, Office of Vehicle Safety Compliance (OVSC) Laboratory Procedure, TP-216-05 and General Testing Laboratories Procedure, TP-216-05B with the following modifications requested by the COTR:

- 1) The vehicle was rigidly mounted in the test fixture by welding vertical supports to the vehicle jack points to prevent any vehicle movement. Chains were not used in an effort to reduce and/or eliminate "pre-stressing" of the vehicle due to the tightening of chains.
- 2) Dial gauges were placed at the vehicle corners and at the passenger door to track overall vehicle motion and the ability of the alternate tie-down procedure to restrict motion of the vehicle.
- 3) String potentiometers were placed at the driver's designated seat position and attached to the interior surface of the roof above a normally positioned 50th percentile Hybrid III ATD head. The string potentiometers tracked the interior motion of the roof.
- 4) Performed the roof crush test to a loading ram displacement of 127 mm or 44,482 N force, whichever comes first.

The data for this portion of the test can be found on Data Sheets 6 and 7.

Based on the test performed, the 2003 Chevrolet Trailblazer appears to meet the requirements of FMVSS 216 testing.

SECTION 3

COMPLIANCE TEST DATA

3.0 TEST RESULTS

The following data sheets document the results of testing on the 2003 Chevrolet Trailblazer.

DATA SHEET 1
FMVSS 216
SUMMARY OF RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2003 CHEVROLET TRAILBLAZER MPV

VEH. NHTSA NO: C30107; VIN: 1GNDT13SX32213808

VEH. BUILD DATE: 11/02; TEST DATE: JULY 28, 2003

TEST LABORATORY: GENERAL TESTING LABORATORIES

OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

A. VISUAL INSPECTION OF TEST VEHICLE

Upon receipt, inspect vehicle for completeness, function, and discrepancies or damage which might influence the testing.

RESULTS:

B. VEHICLE DATA

- (1) Vehicle type as shown on certification label: MPV
 (2) Vehicle UVW as recorded on Data Table 2: 2018.6 kg

C. STATIC LOAD TEST OF DRIVER SIDE OF ROOF

Minimum roof crush resistance required by FMVSS 216 for the vehicle tested:

MCCR as recorded on Data Table 2: 29,673 N

Maximum roof crush resistance measured during test was
42,808 N at 72.4 mm

PASS FAIL

X _____

D. POST TEST VISUAL INSPECTION

Flattened area on roof on driver's side from "A" pillar to "C" pillar approximately 1500 mm long x 650 mm wide. Windshield shattered, driver door glass shattered, driver's "A" pillar and "B" pillar are bent.

RESULTS:

REMARKS:

RECORDED BY: [Signature]
 APPROVED BY: [Signature]

DATE: 07/28/03

DATA SHEET 2
FMVSS 216
RECEIVING INSPECTION

VEH. MOD YR/MAKE/MODEL/BODY: 2003 CHEVROLET TRAILBLAZER MPV

VEH. NHTSA NO: C30107; VIN: 1GNDT13SX32213808

VEH. BUILD DATE: 11/02; TEST DATE: JULY 28, 2003

TEST LABORATORY: GENERAL TESTING LABORATORIES

OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Upon receipt, the vehicle will be examined visually for completeness, function, and damage. The roof and supporting structures such as the doors and windows should be checked for proper operation and any discrepancies which may influence the testing. The vehicle will be weighed and the minimum roof crush resistance determined.

RESULTS:

(1) Unloaded Vehicle Weight (UVW)

Left Front	<u>550.7</u>	kg	Left Rear	<u>470</u>	kg
Right Front	<u>517.5</u>	kg	Right Rear	<u>480.4</u>	kg
Front Axle	<u>1068.2</u>	kg	Rear Axle	<u>950.4</u>	kg

TOTAL UVW 2018.6 kg

(2) Vehicle type as shown on vehicle certification label: MPV

(3) Minimum Roof Crush Resistance (MCRR):

Passenger Car:

UVW x 1.5 x 9.8 = N/A N

MCRR = N/A N (UVW x 1.5 x 9.8 or 22,241 N whichever is less)

MPV, Truck or Bus:

MCRR = UVW x 1.5 x 9.8 = 29,673 N

(4) Other Comments: _____

REMARKS:

RECORDED BY: [Signature]

APPROVED BY: [Signature]

DATE: 07/28/03

DATA SHEET 3
FMVSS 216
PRE-TEST PREPARATION

VEH. MOD YR/MAKE/MODEL/BODY: 2003 CHEVROLET TRAILBLAZER MPV

VEH. NHTSA NO: C30107; VIN: 1GNDT13SX32213808

VEH. BUILD DATE: 11/02; TEST DATE: JULY 28, 2003

TEST LABORATORY: GENERAL TESTING LABORATORIES

OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Prior to testing, the following will be accomplished:

- A. Secure any convertible top, movable or removable roof structure in their weather tight positions Removed Roof Rack
- B. Close all windows OK
- C. Close and lock all doors OK
- D. State Side of Roof Tested Driver
- E. Measure the lateral angle of the test device at sufficient points to determine that it has a 25 degree (plus zero degree, minus one degree) angle 25°
- F. Measure the longitudinal angle of the loading device at sufficient points to determine that it has a 5 degree (plus zero minutes, minus 20 minutes) 5°
- G. The test device will initially contact the roof at 254 mm aft of windshield
- H. If the test device was relocated based on the requirements of Chapter 12.3 paragraph F, describe where the test device will initially contact the roof as relocated N/A
- I. Ambient temperature 51 mm from the vehicle roof in the immediate area of the test device: 27.2 degrees C.

REMARKS:

RECORDED BY: [Signature]

APPROVED BY: [Signature]

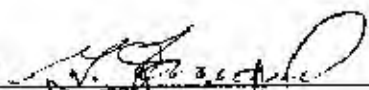
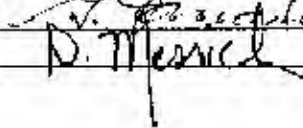
DATE: 07/28/03

DATA SHEET 4
FMVSS 216VEH. MOD YR/MAKE/MODEL/BODY: 2003 CHEVROLET TRAILBLAZER MPVVEH. NHTSA NO: C30107; VIN: 1GNDT13SX32213808VEH. BUILD DATE: 11/02; TEST DATE: JULY 28, 2003TEST LABORATORY: GENERAL TESTING LABORATORIESOBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

RESULTS: Plots of load versus displacement and time versus displacement showed that:

- (1) The maximum roof crush resistance was 42,808 N at 72.4 mm
- (2) The rate of loading was 5.08 mm/sec (.2 in/sec)
- (3) The required roof crush resistance of 29,673 N was at 40.1 mm

REMARKS:

RECORDED BY: DATE: 07/28/03APPROVED BY: 

OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

RESULTS: Flattened area on roof on driver's side from "A" pillar to "C" pillar approximately 1500 mm long x 650 mm wide. Windshield shattered, driver door glass shattered, driver's "A" pillar and "B" pillar are bent.

DATE: 07/28/03

DATA SHEET 6
FMVSS 216 MODIFIED PORTION PRE-TEST

VEH. MOD YR/MAKE/MODEL/BODY: 2003 CHEVROLET TRAILBLAZER MPV

VEH. NHTSA NO: C30107; VIN: 1GNDT13SX32213808

VEH. BUILD DATE: 11/02; TEST DATE: JULY 28, 2003

TEST LABORATORY: GENERAL TESTING LABORATORIES

OBSERVERS: GRANT FARRAND, JIMMY LATANE, AMANDA PRESCOTT

Driver Seat Torso Angle: 24°

Driver Seat "H" Point Location at Mid Travel:

X= 260 mm aft from centerline of front outboard seat mounting bolt

Y= 203 mm inboard from centerline of front outboard seat mounting bolt

Z= 310 mm up from centerline of front outboard seat mounting bolt

Point VRL (Vertical Measurement from H-Point to Headliner): 904.2 mm

Point VRI (Vertical Measurement from H-Point to Structure Above Headliner): 924.6 mm

Point RE (Distance from H-Point to a point 112mm behind point VRI): 942.3 mm

#1 LVDT (R.F.) Length: 930 mm

#2 LVDT (R.R.) Length: 907 mm

#3 LVDT (L.R.) Length: 907 mm

Distance from LVDT #1 (R.F.) to LVDT #2 (R.R.) = 270 mm

Distance from LVDT #2 (R.R.) to LVDT #3 (L.R.) = 250 mm

Distance from LVDT #1 (R.F.) to LVDT #3 (L.R.) = 370 mm

All LVDT's are located on a 185 mm radius from a vertical line passing through the seat "H" point. Using the forward direction as 0° reference and measuring clockwise, LVDT #1 is located at 43°, LVDT #2 is located at 137° and LVDT #3 is located at 222°.

NOTES:

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APPROVED BY: 

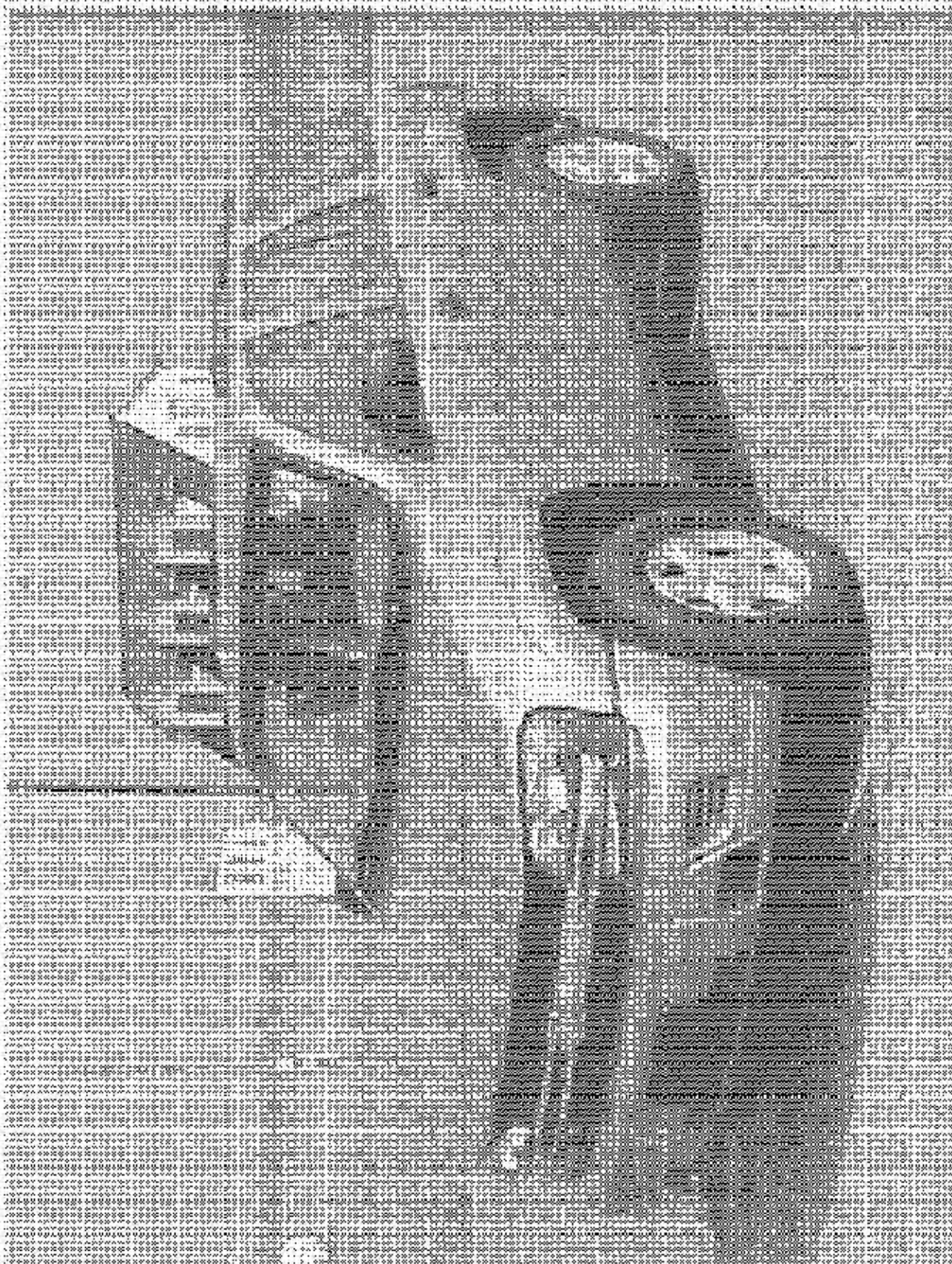
DATE: 07/28/03

SECTION 4 INSTRUMENTATION AND EQUIPMENT LIST

TABLE 1 - INSTRUMENTATION & EQUIPMENT LIST

EQUIPMENT	DESCRIPTION	MODEL/ SERIAL NO.	CAL. DATE	NEXT CAL. DATE
COMPUTER	AT&T	486D66	BEFORE USE	BEFORE USE
TEST FIXTURE	GTL	N/A	N/A	N/A
A/D INTERFACE	METRABYTE	DAS-16(F)	BEFORE USE	BEFORE USE
SIGNAL CONDITIONER	METRABYTE	EXP-RES	BEFORE USE	BEFORE USE
LOAD CELL	REVERE	USP2/46024	06/03	06/04
DIAL INDICATOR	MITUTOYO	2424-10	BEFORE USE	BEFORE USE
LINEAR POTENTIOMETER	SERVO SYSTEMS	20/69	BEFORE USE	BEFORE USE
LINEAR POTENTIOMETER	SERVO SYSTEMS	20/70	BEFORE USE	BEFORE USE
LINEAR POTENTIOMETER	SERVO SYSTEMS	20/72	BEFORE USE	BEFORE USE
LINEAR POTENTIOMETER	ELECTRIC ASSOC. INC.	11A4A6	BEFORE USE	BEFORE USE

SECTION 5
PHOTOGRAPHS



2000 CHRYSLER PT CRUISER

NHTSA NO. C00007

PLATE NO. 119

FIGURE 1

3. FORWARD VIEW OF VEHICLE ON TESTED
SIDE BEFORE TESTING

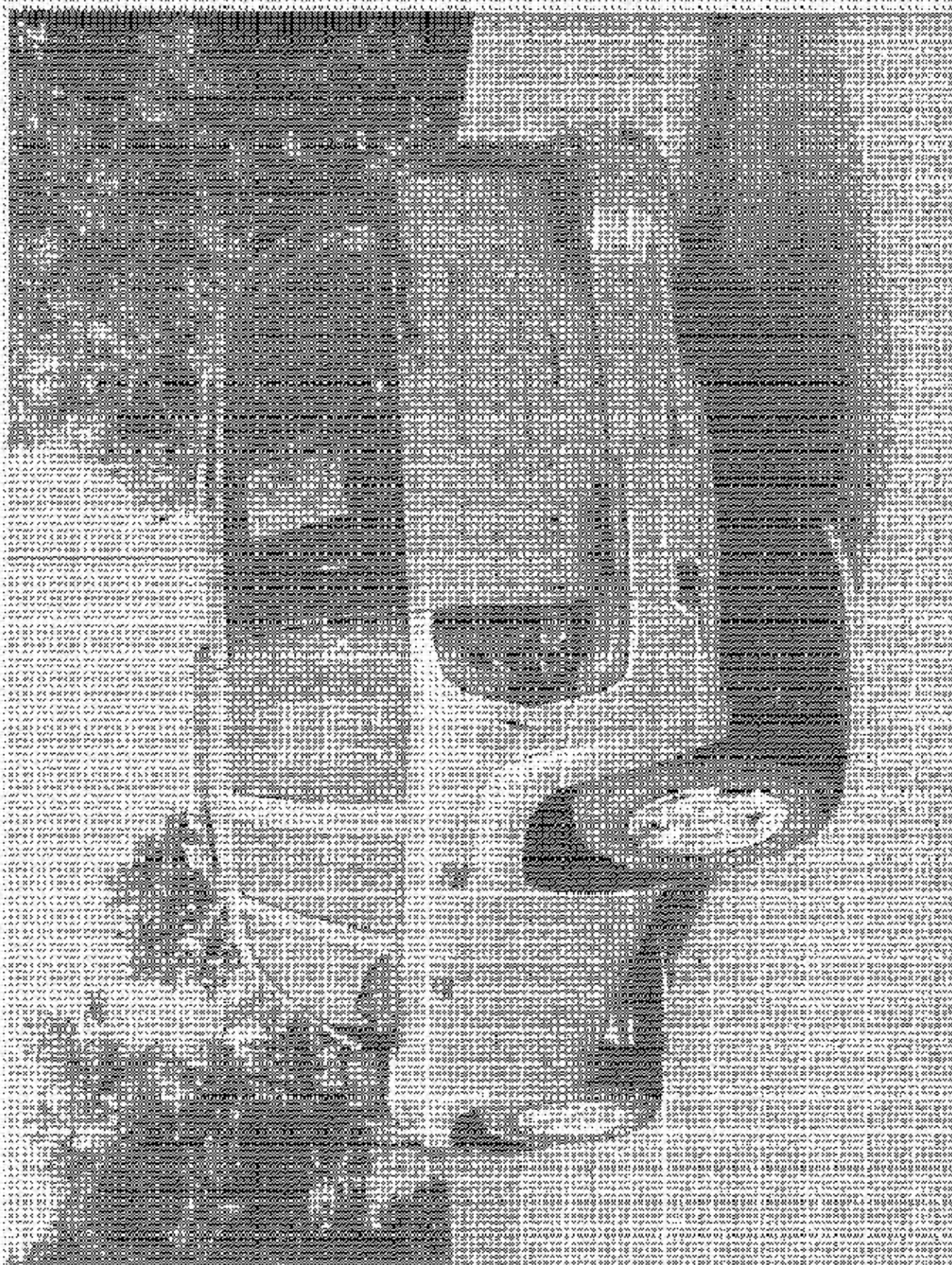
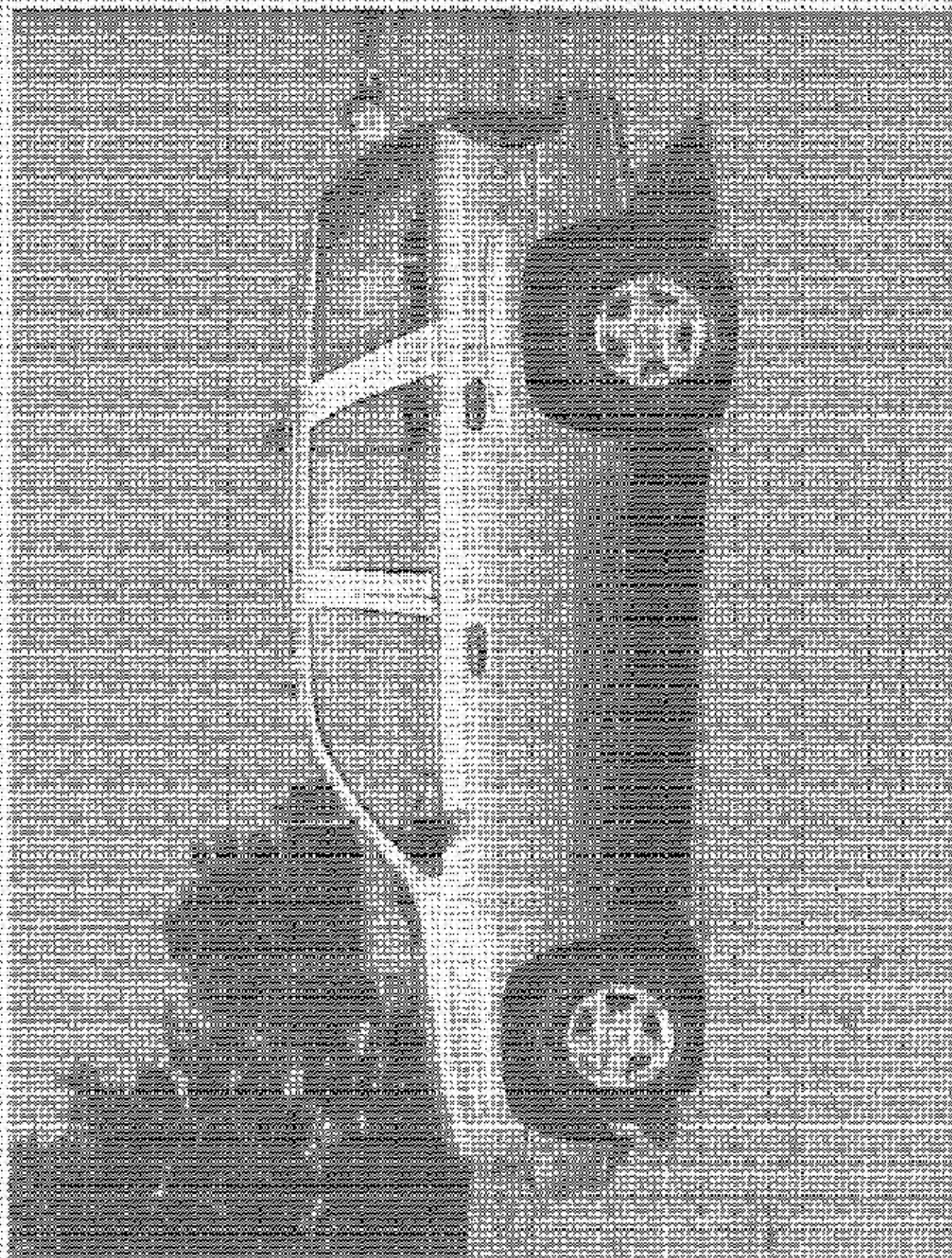


FIGURE 5.2
REARWARD VIEW OF VEHICLE ONTESTED
SIDE BECHTESTING

2003 CHEVROLET TRAILBLAZER
NHTSA NO. 030107
FMVSS NO. 216



2001 CHEVROLET EL CAMINO BLAZER
NHTSA NO. C-2012
HAYS NO. 216

FIGURE 5
LEFT SIDE VIEW OF VEHICLE BEFORE
TESTING

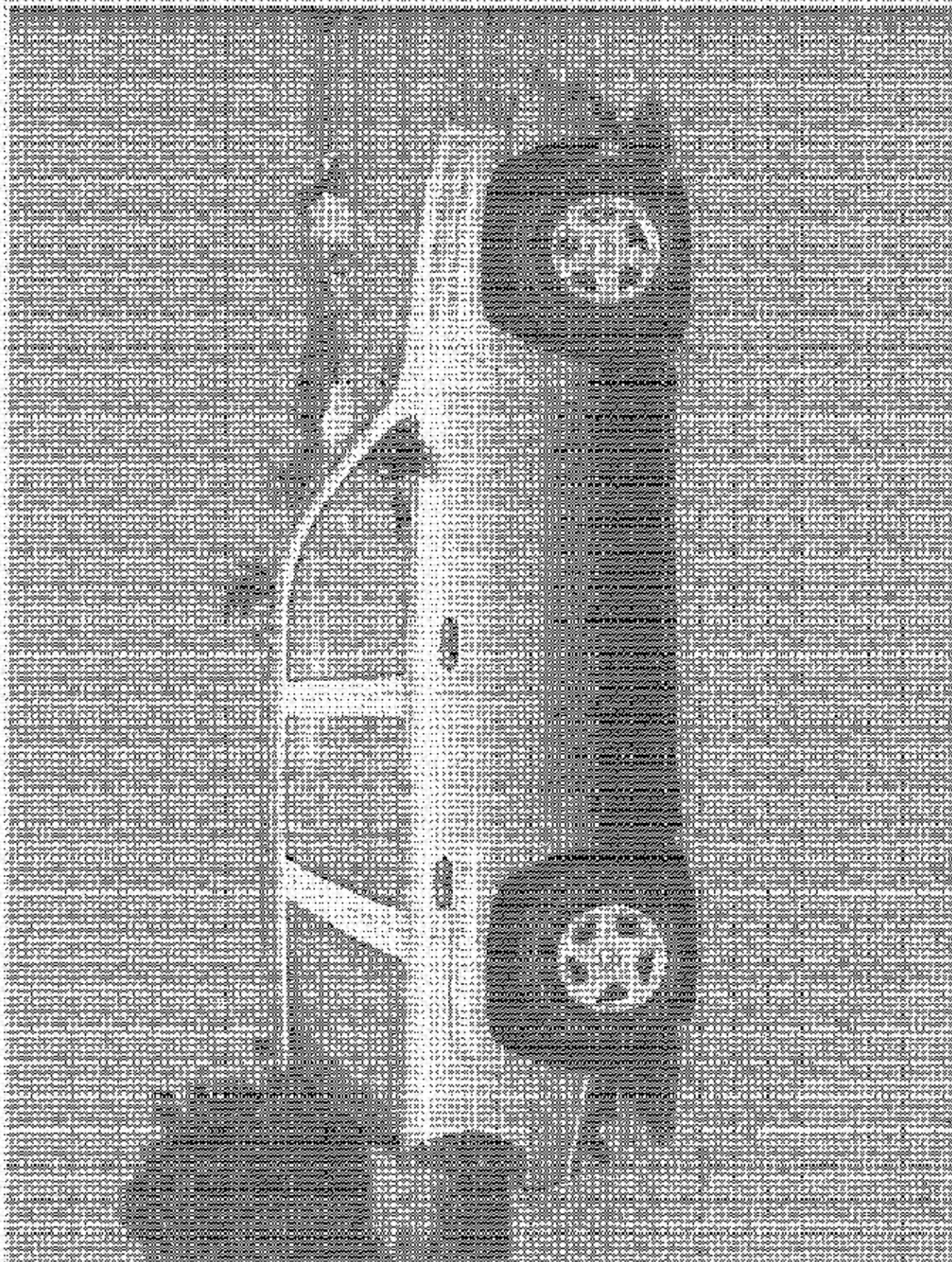
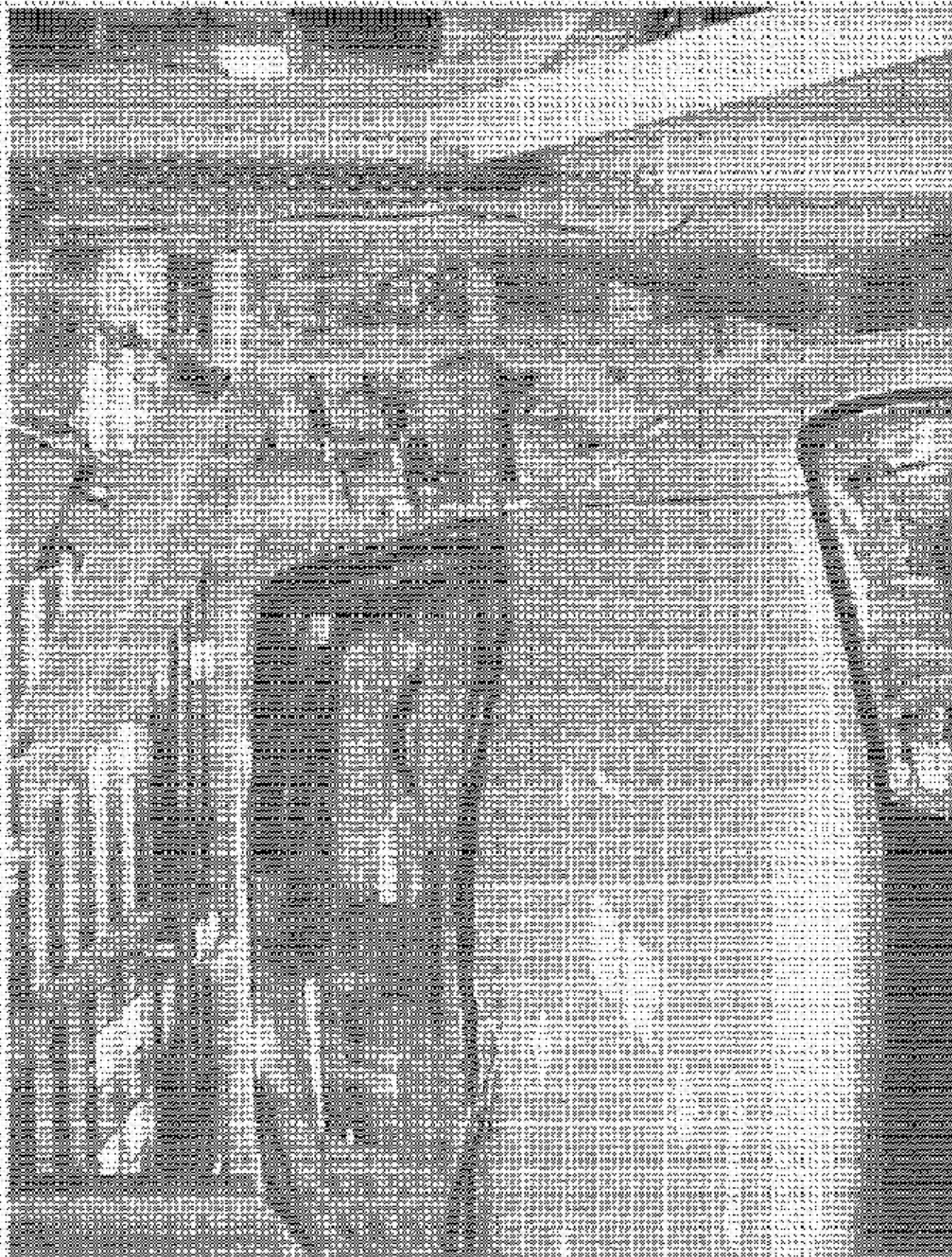


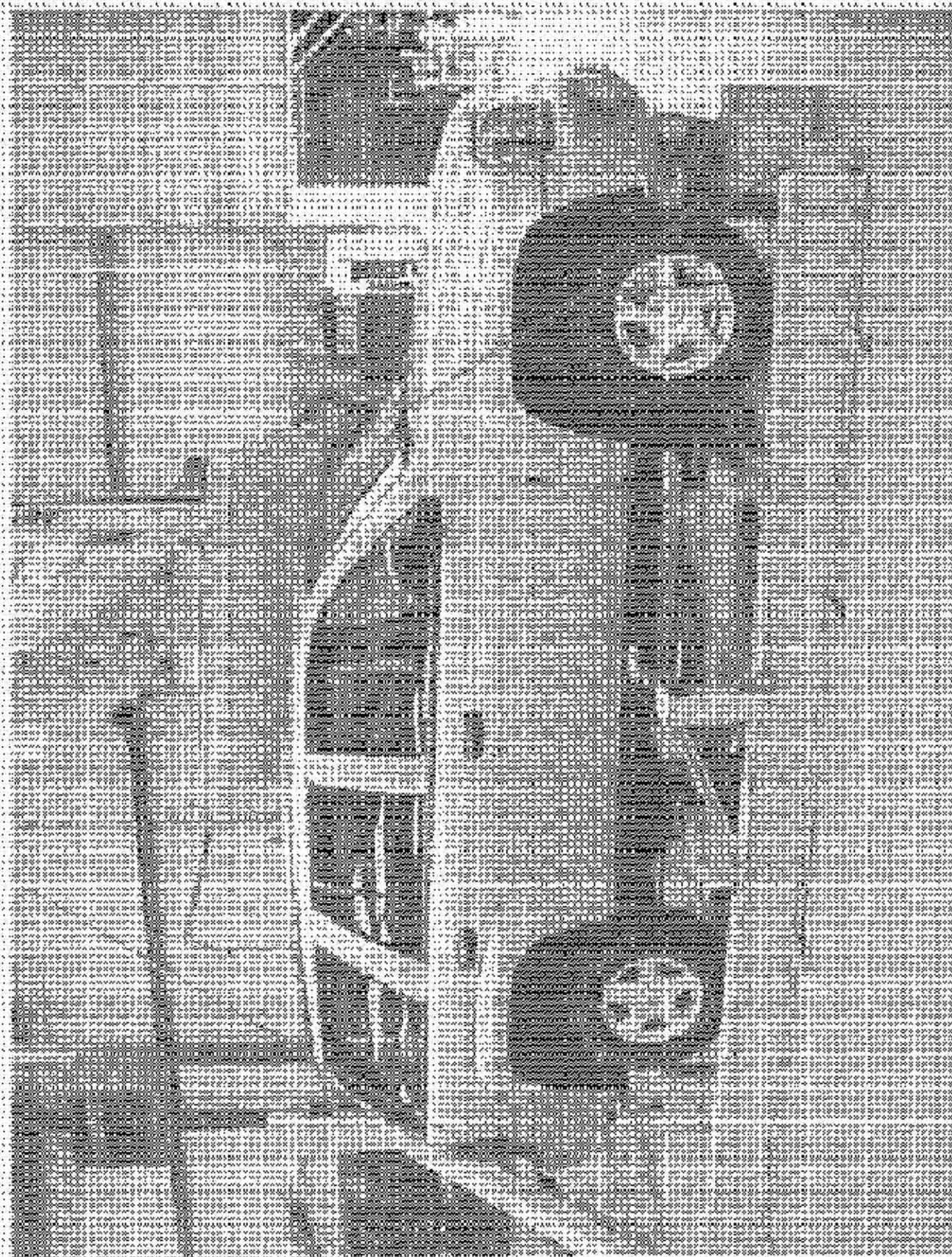
FIGURE 5-4
REAR SIDE VIEW OF VEHICLE BEFORE
TESTING

2003 CHRYSLER PT CRUISE
AIRS NO. 02010
PASS NO. 318



2006 CHEVROLET MALIBU
NHTSA NO. C60012
FVSS NO. 219

FIGURE 30
FRONT VIEW OF RESEARCH VEHICLE



2003 CHEVROLET TRAILBLAZER
NHTSA NO. 030107
FMVSS NO. 216

EXAMINE & TEST FOR
VOLUNTARY TESTING

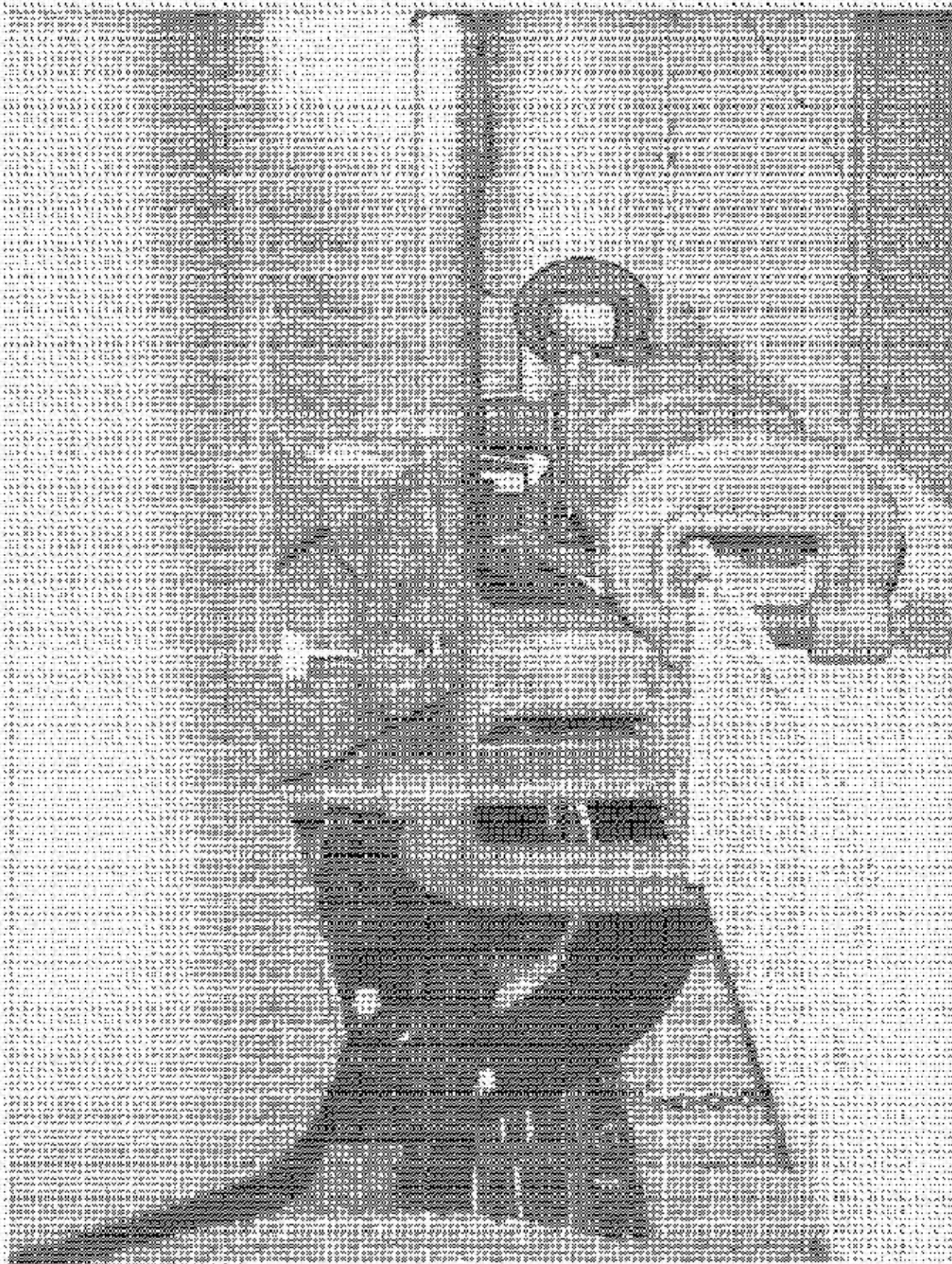
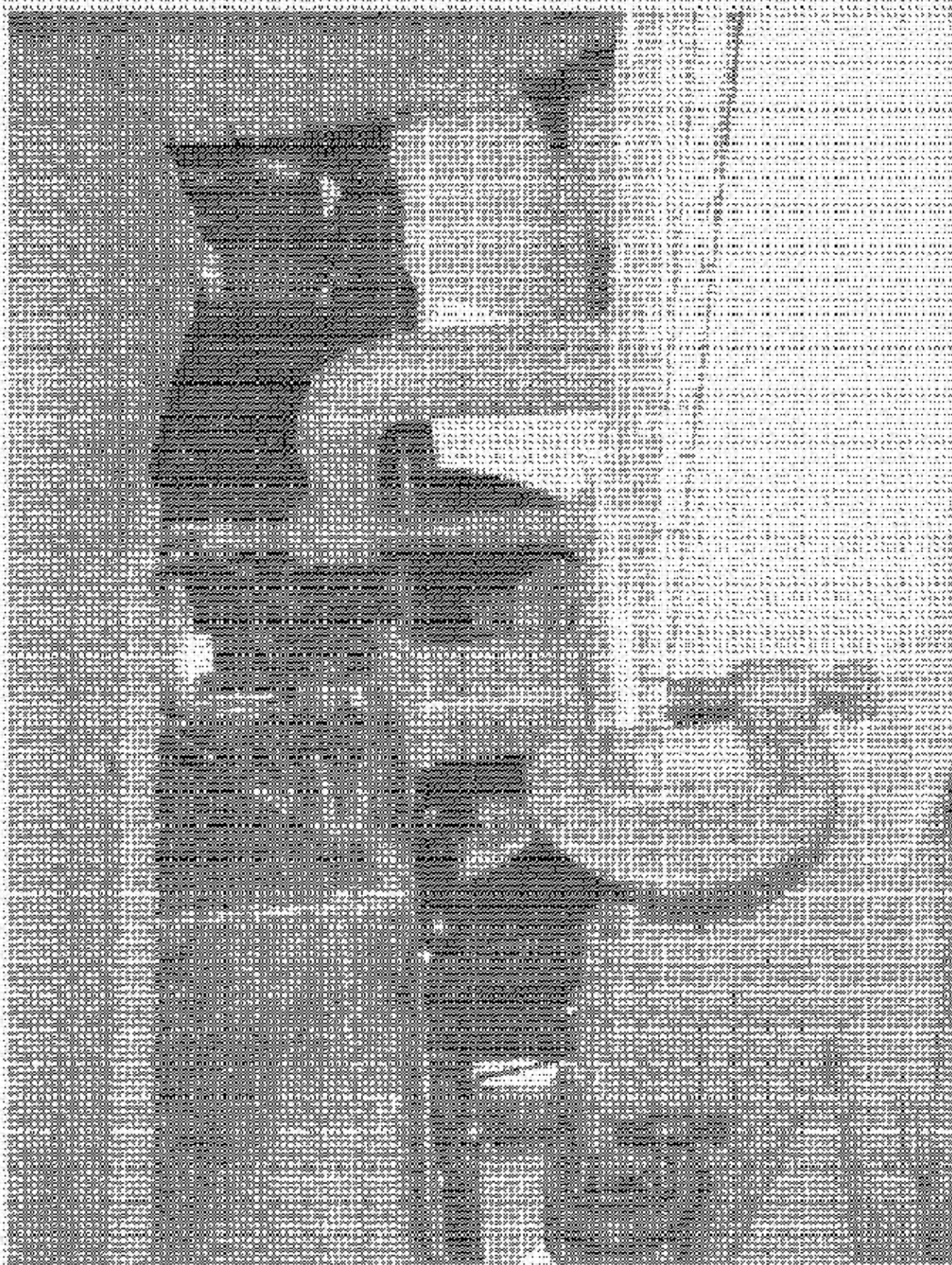


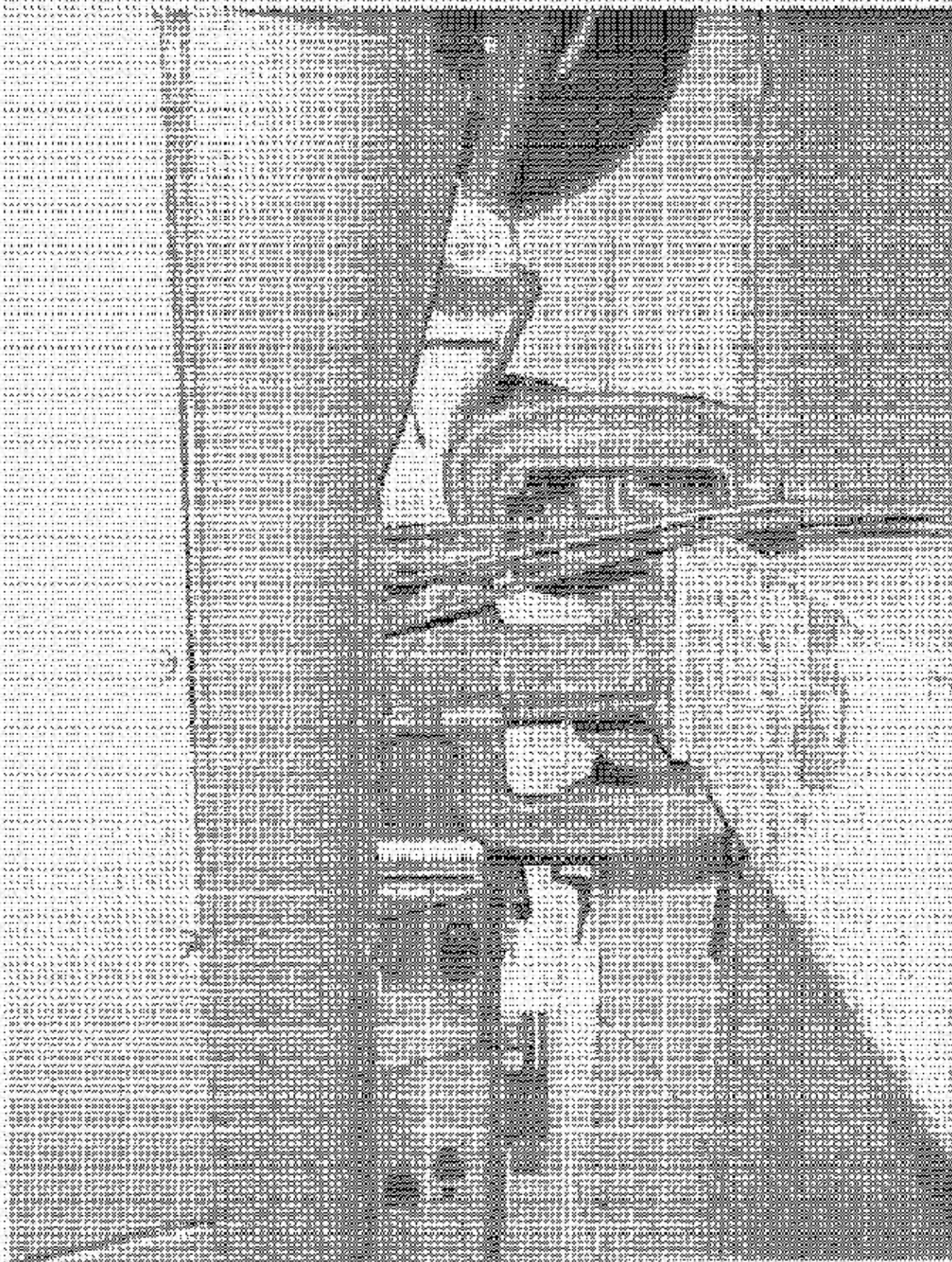
FIGURE 57
LEFT FRONT VEHICLE MOVEMENT

2001 CHEVROLET TRAILBLAZER
NHTSA NO. C30-07
FMSIS NO. 216



CHEVROLET TRAIL BLAZER
NHTSA NO. CAG107
FAYSS NO. 210

FIGURE 55
RIGHT FRONT VEHICLE MOUNTING



2003 CHEVROLET TRAILBLAZER
NHTSA NO. C3010
FMVSS NO. 215

FIGURE 59
LEFT REAR VEHICLE MOUNTING

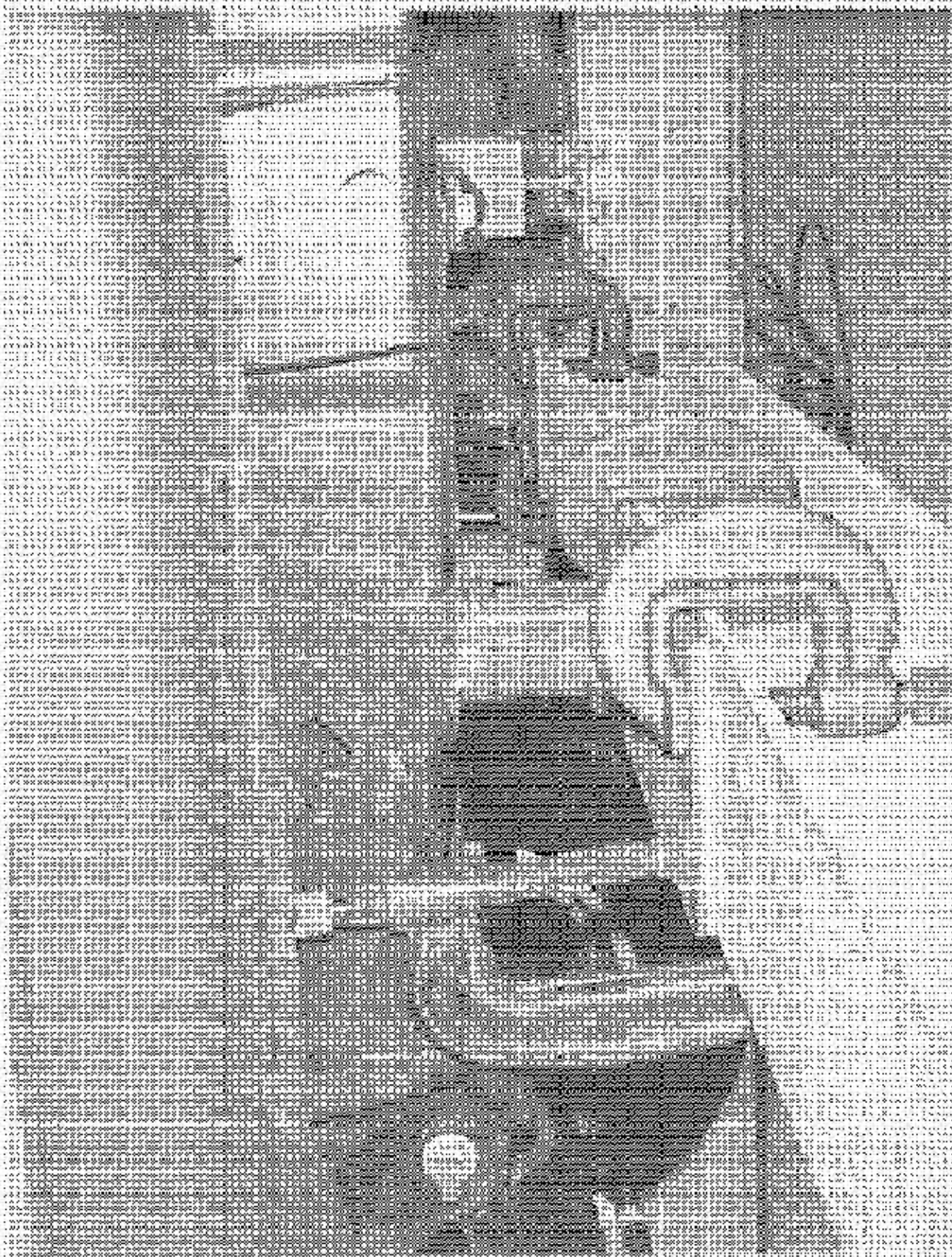


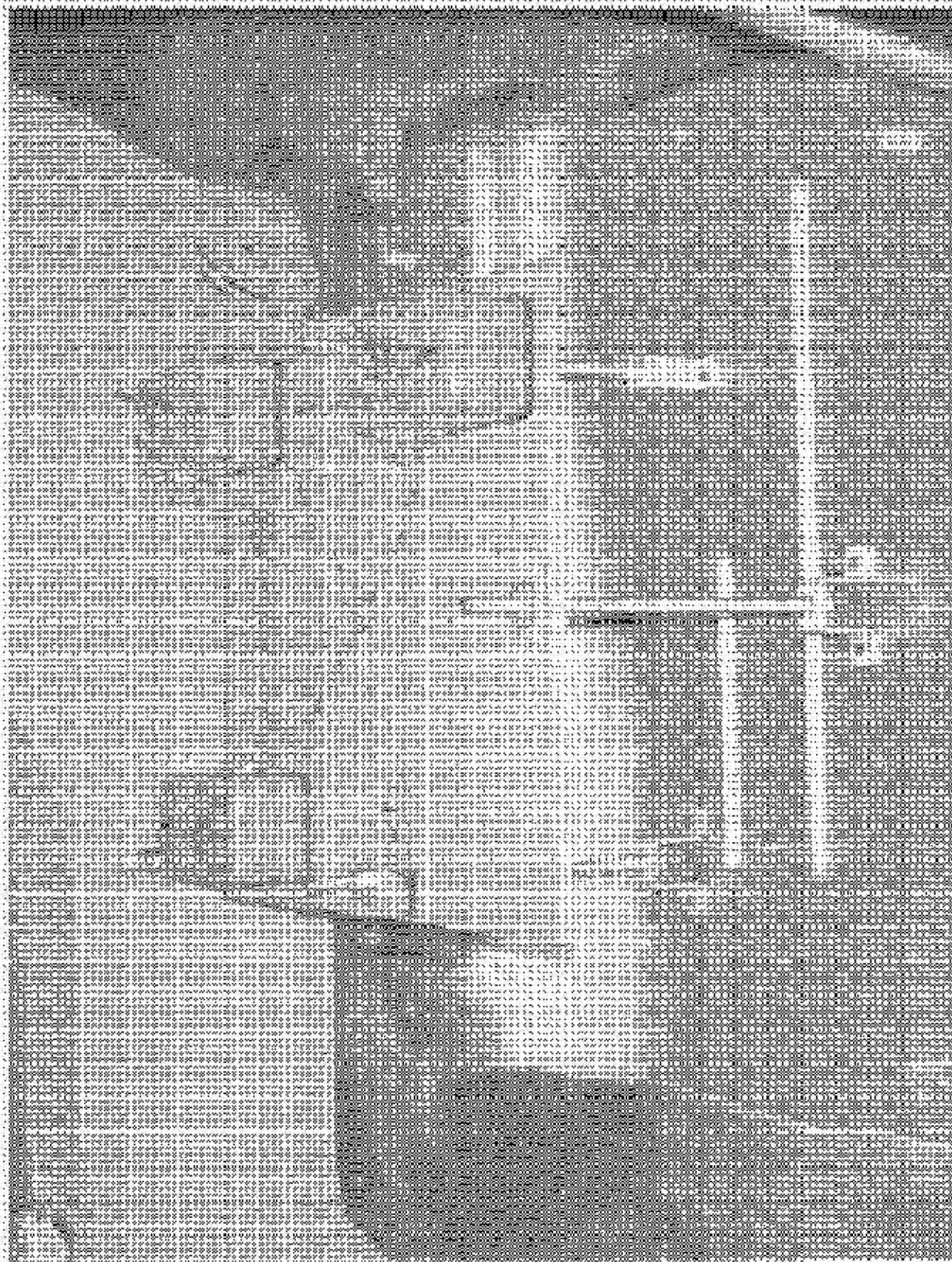
FIGURE 5-10
RIGHT REAR VEHICLE MOUNTING

2503 CHEVROLET TRAILBLAZER
NHTSA NO. C30107
FMVSS NO. 215



2000 CHEVROLET TRAILBLAZER
NHTSA NO. C80107
FMVSS NO. 216

FIGURE 5.11
LYOT DISPLACEMENT MOUNTING TO ROOF



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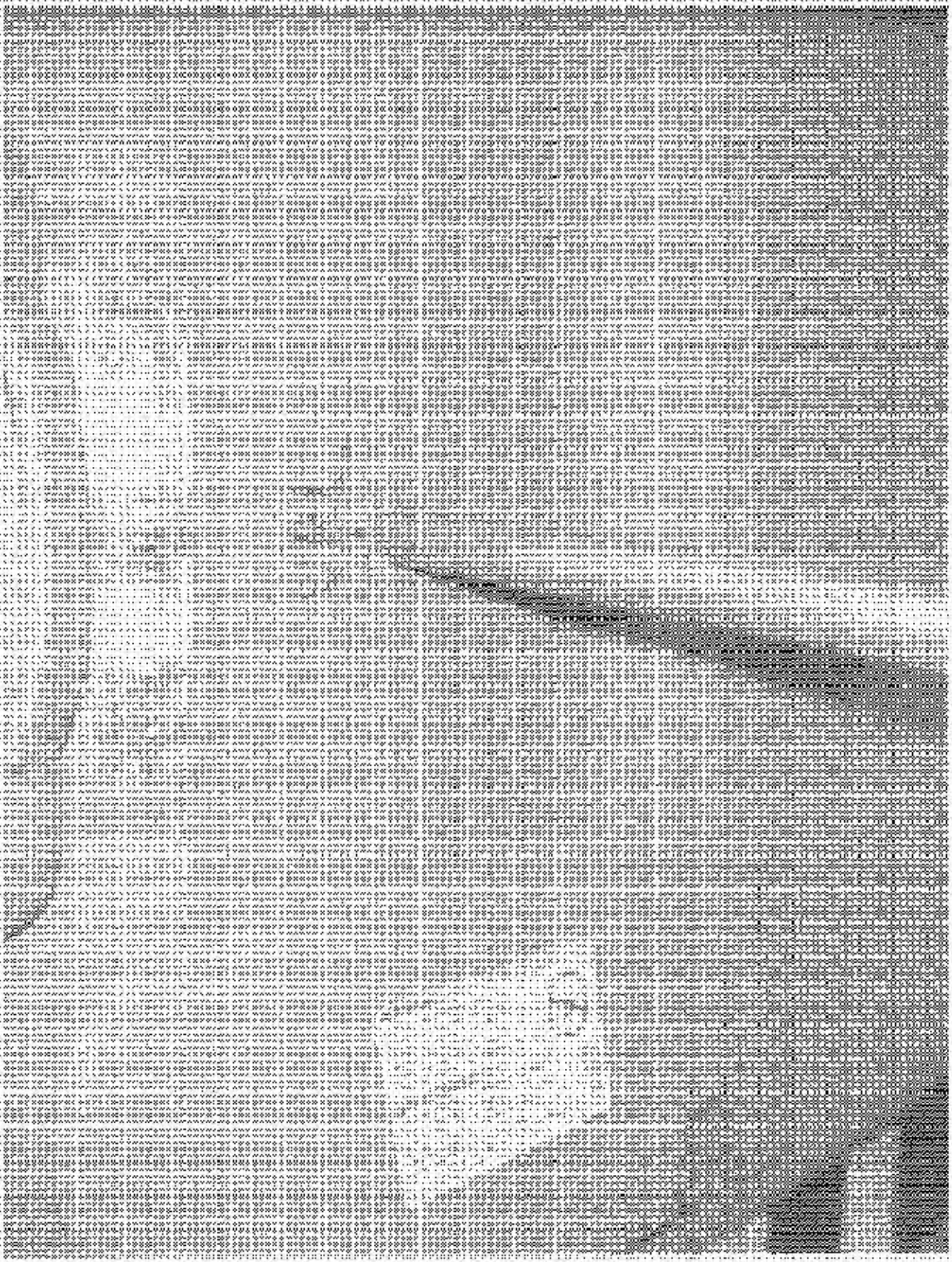
CLVS NO. 215

FIGURE 2-2

LYOT TRANSPIRER MOUNTING AT 4.5 POINT

FIGURE 5-13
VIEW SHOWING MEASUREMENT OF VSL

2003 CHEVROLET TAHOE
NHTSA NO. C32107
FMVSS NO. 216



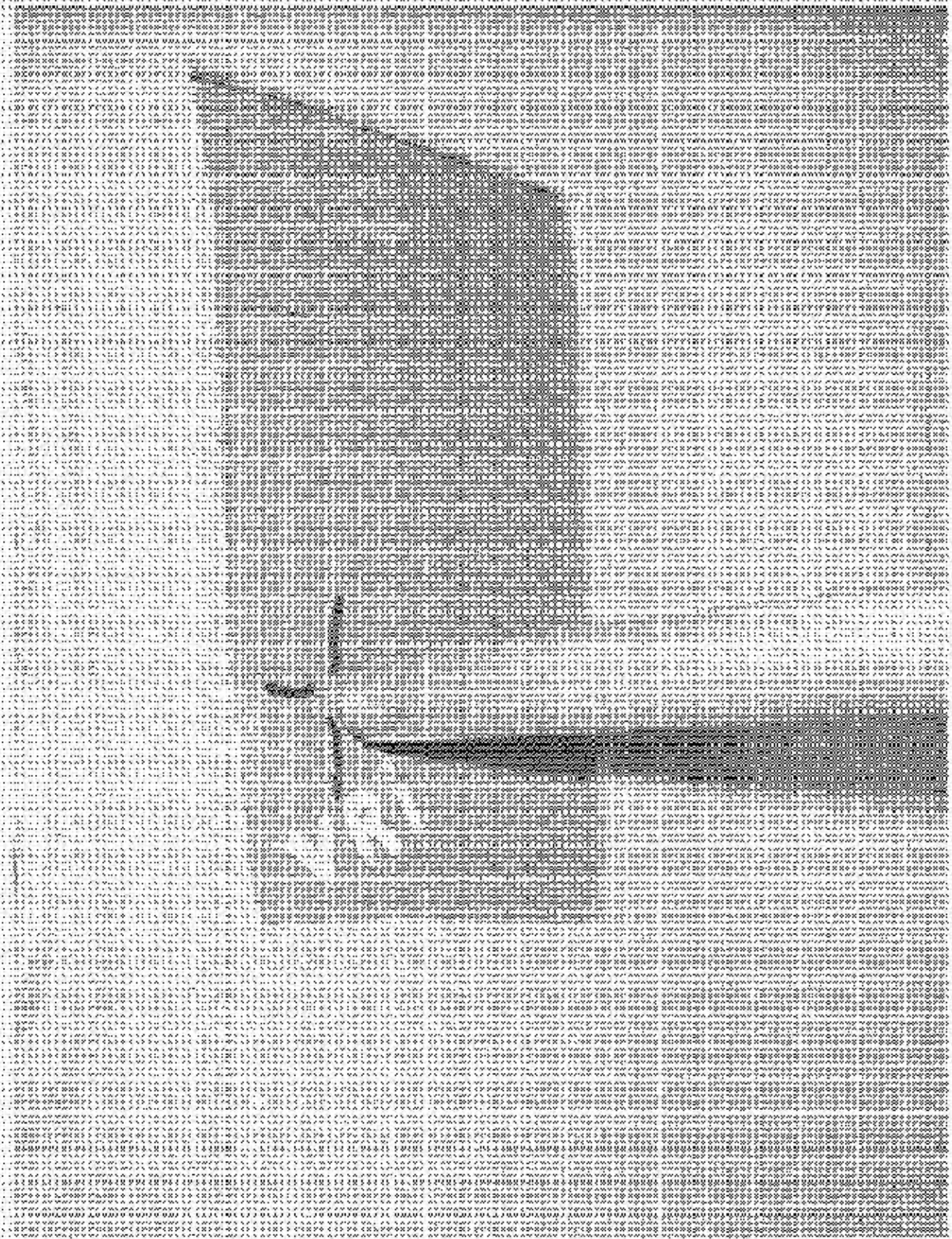


FIGURE 5-4
VIEW SHOWING REAR VIEW OF VEHICLE

2003 CHEVROLET TRAIL BLAZER
NHTSA NO. 020107
CLASS NO. 210

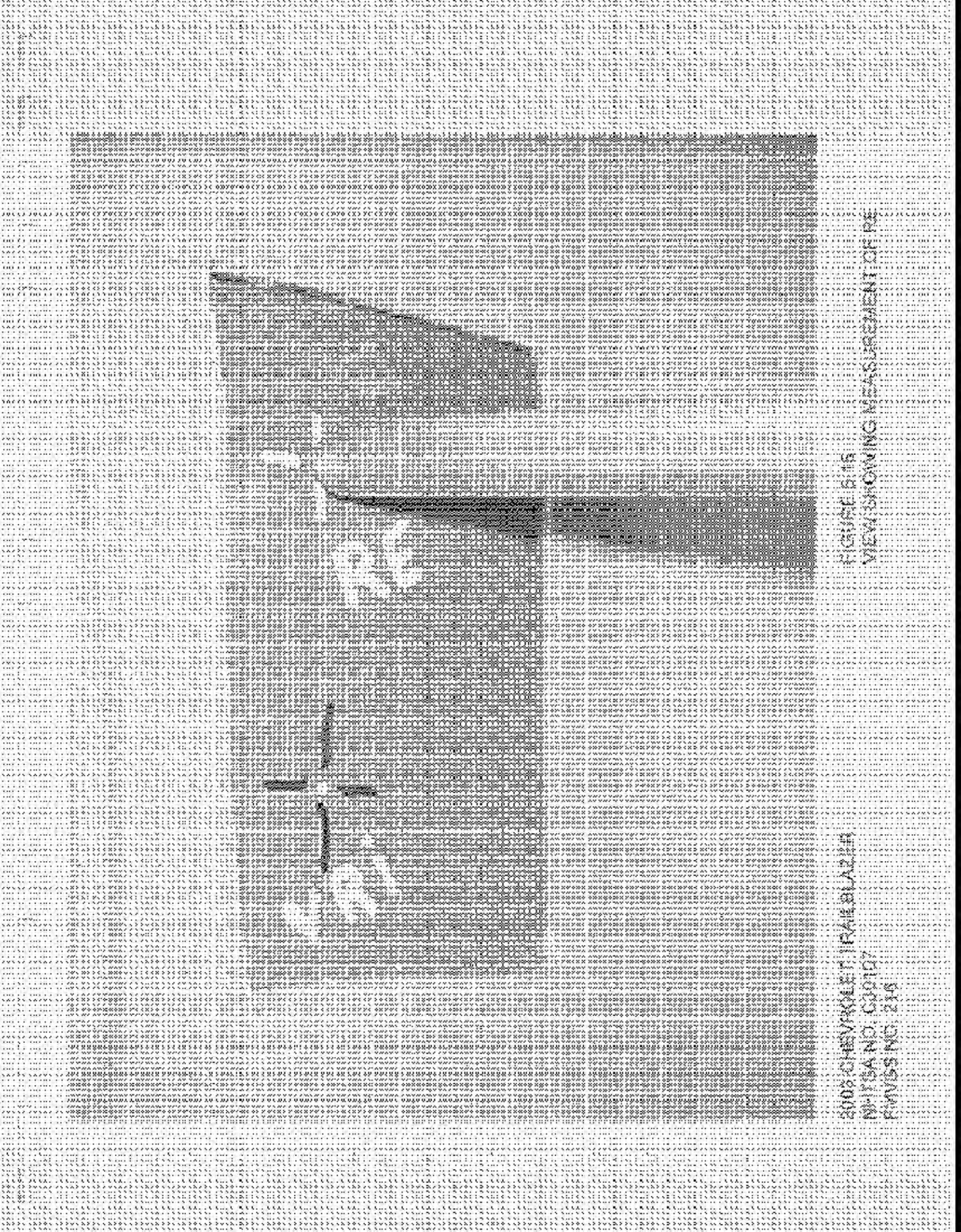
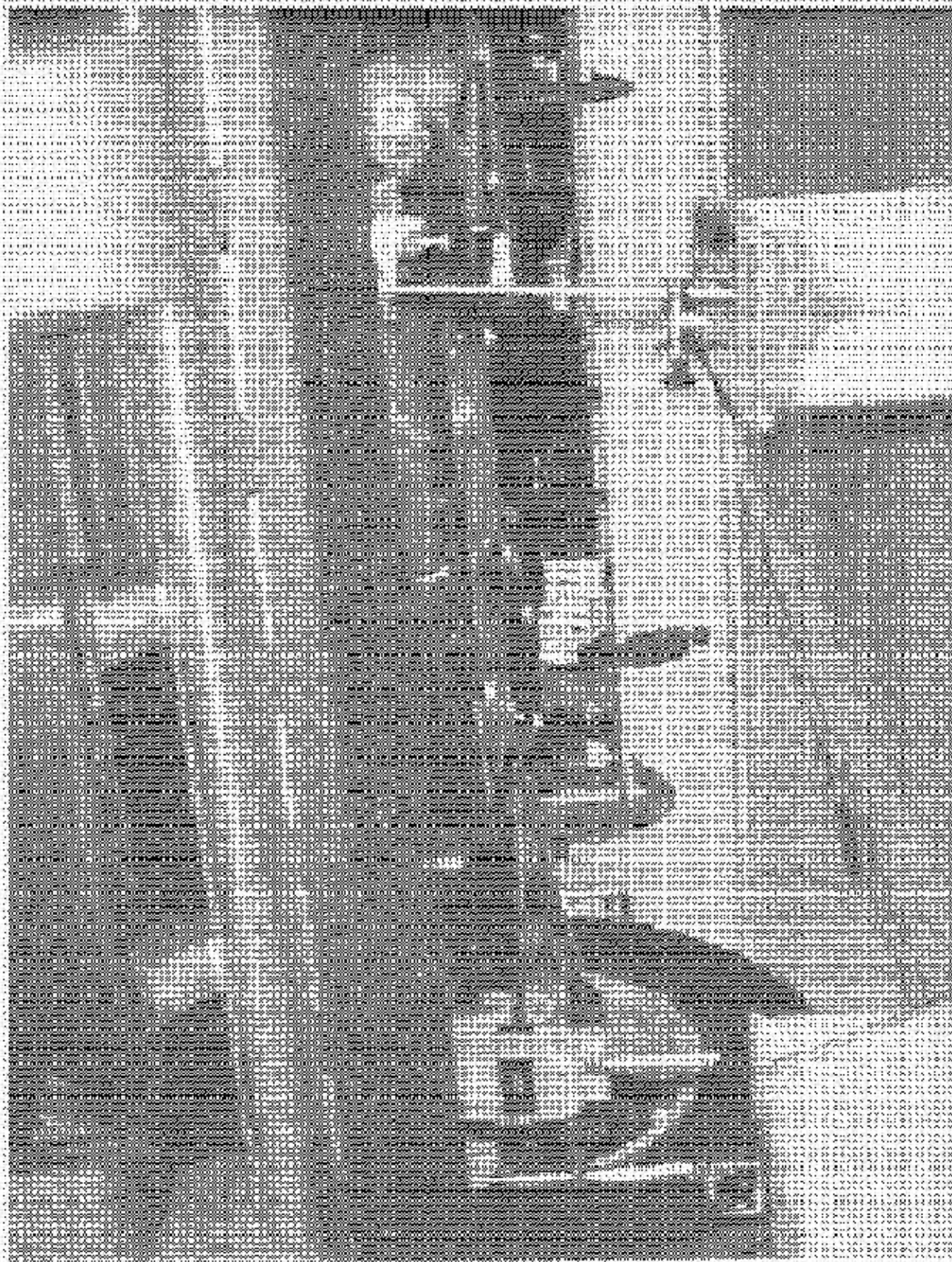


FIGURE 6-15
VIEW SHOWING MEASUREMENT OF RE

2003 CHEVROLET IMPALA 2.2H
NHTSA NO. C09107
FMVSS NO. 210



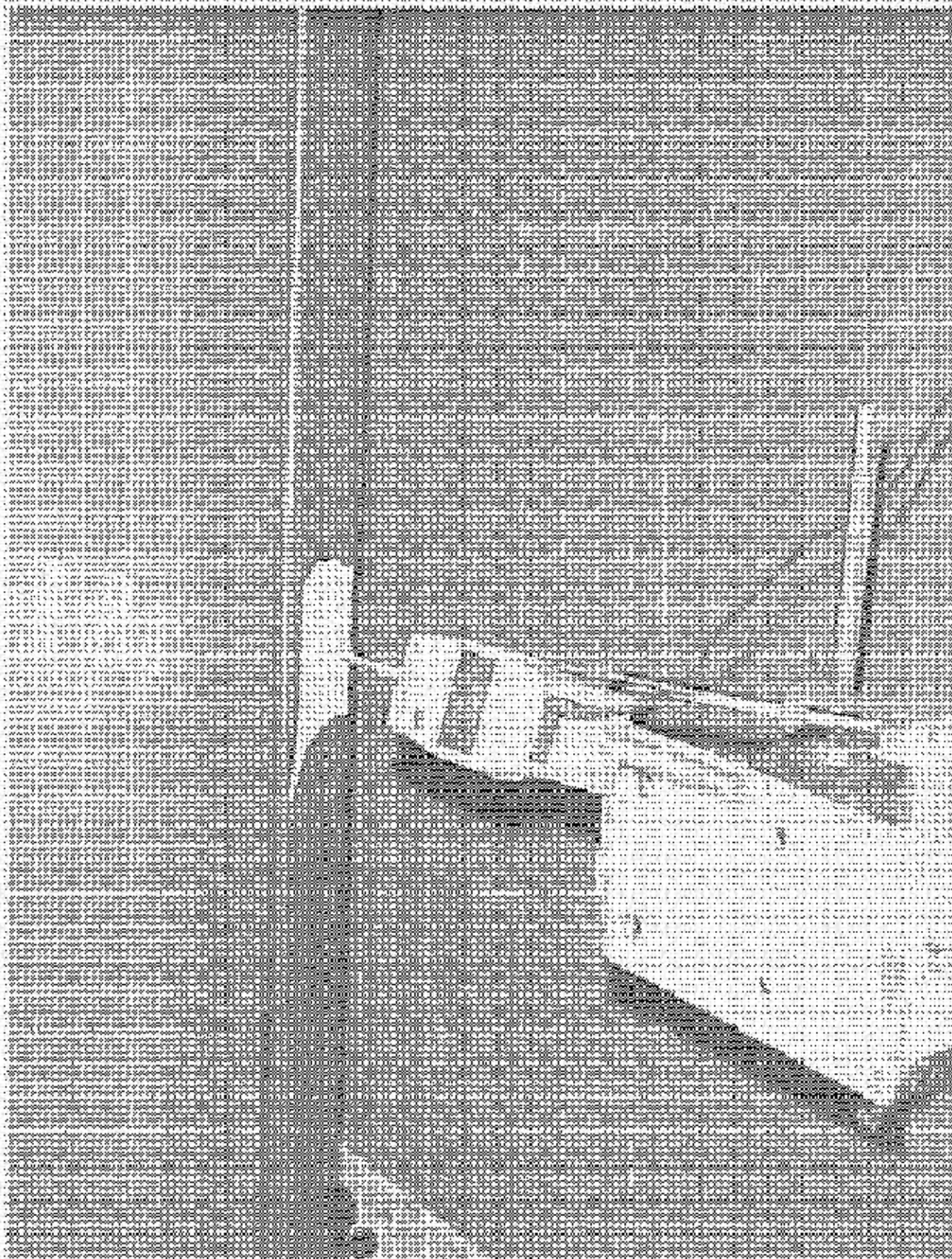
2003 CHEVROLET TRAILBLAZER

NHTSA NO. 0220107

FMA/SS NO. 216

FIGURE 5-10

DISPLACEMENT INDICATORS AT FRONT OF
VEHICLE



2002 C-17E HOLEE TPAUGLAXER
NHTDA NO. 030107
REVSS NO. 215

FIGURE 17
DISPLACEMENT INDICATORS AT PASSENGER
DOOR SILE

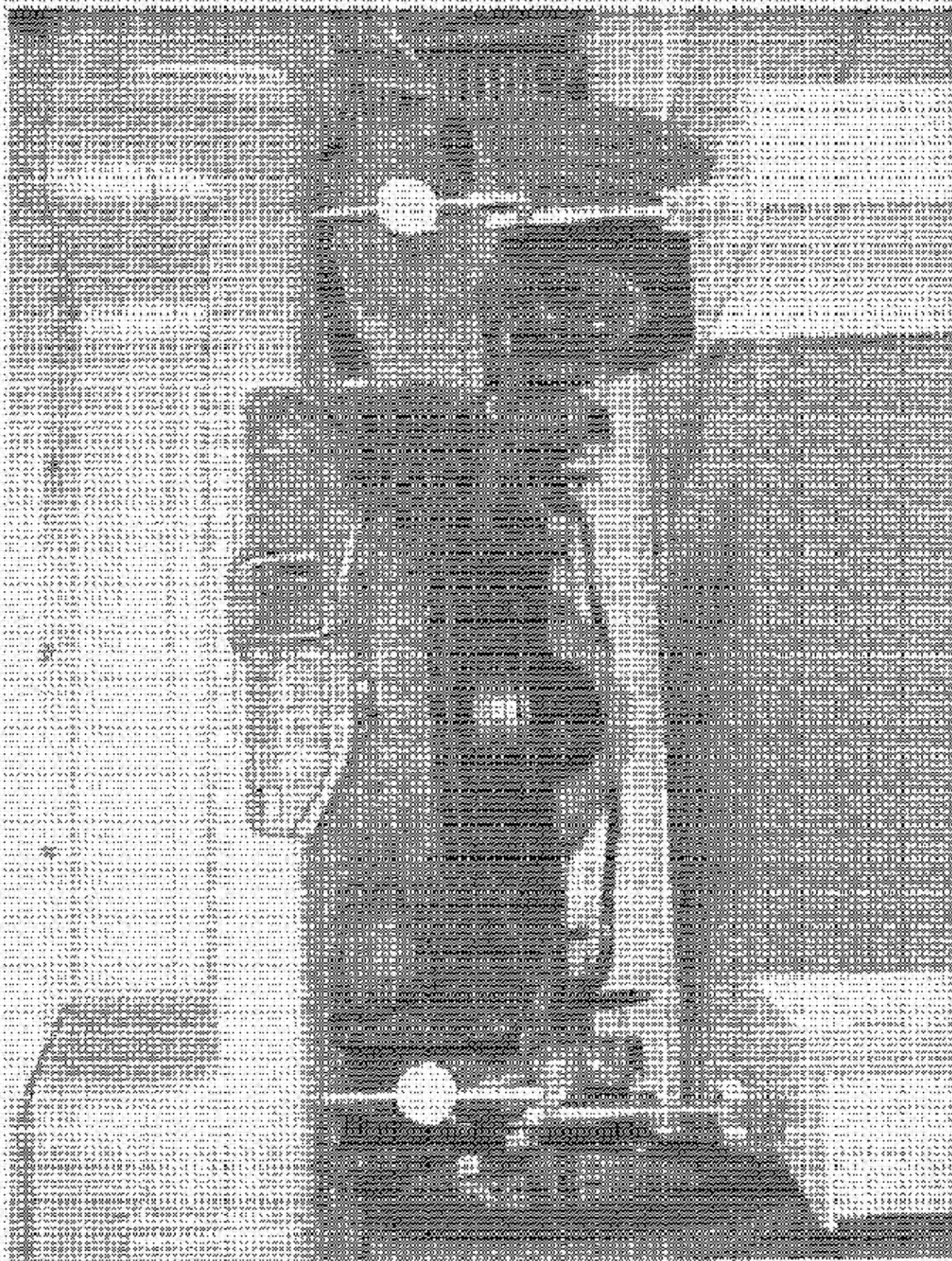


FIGURE 6-18
DISPLACEMENT INDICATORS AT REAR OF
VEHICLE

2003 CHEVROLET TRAILBLAZER
NHTSA NO. C39107
FMVSS NO. 215



2003 CHEVROLET TRAILBLAZER
UNITA NO. 030107
FVWS8 NO. 210

FIGURE 3-19
FRONT VIEW OF LOADING DEVICE PLACED
AGAINST VEHICLE ROOF



FIGURE 620
REAR VIEW OF LOADING DEVICE PLACED
AGAINST VEHICLE ROOF

2003 CHEVROLET TRAIL BLAZER
NHTSA NO. 020107
FMVSS NO. 216



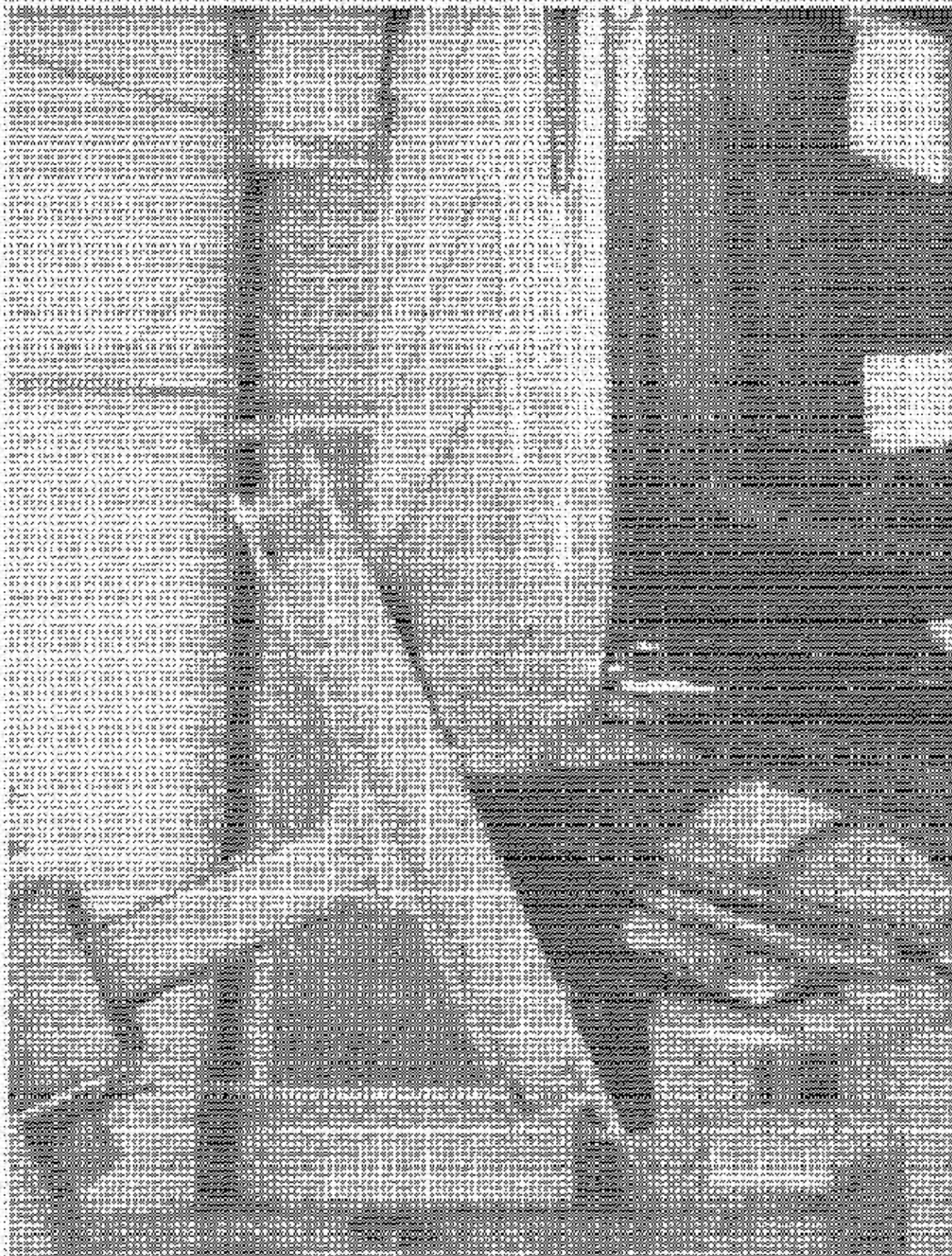
FIGURE 62
SIDE VIEW OF LOADING DEVICE PLACED
AGAINST VEHICLE ROOF

2004 CHEVY K1500, F4E BLAZER
NHTSA NO. C0310
FMVSS NO. 210



FIGURE 5.22
FRONT VIEW OF LOADING DEVICE PLACED
AGAINST VEHICLE ROOF AT FULL LOAD

300X CHEVROLET TRAILER
NHTSA NO. Q30107
RMVSS NO. 245



2001 CHEVROLET TRAIL BLAZER
RHTA NO. 120107
CLASS NO. 216

FIGURE 3-23
REAR VIEW OF LOADING DEVICE PLACED
AGAINST VEHICLE REAR AT FULL LOAD

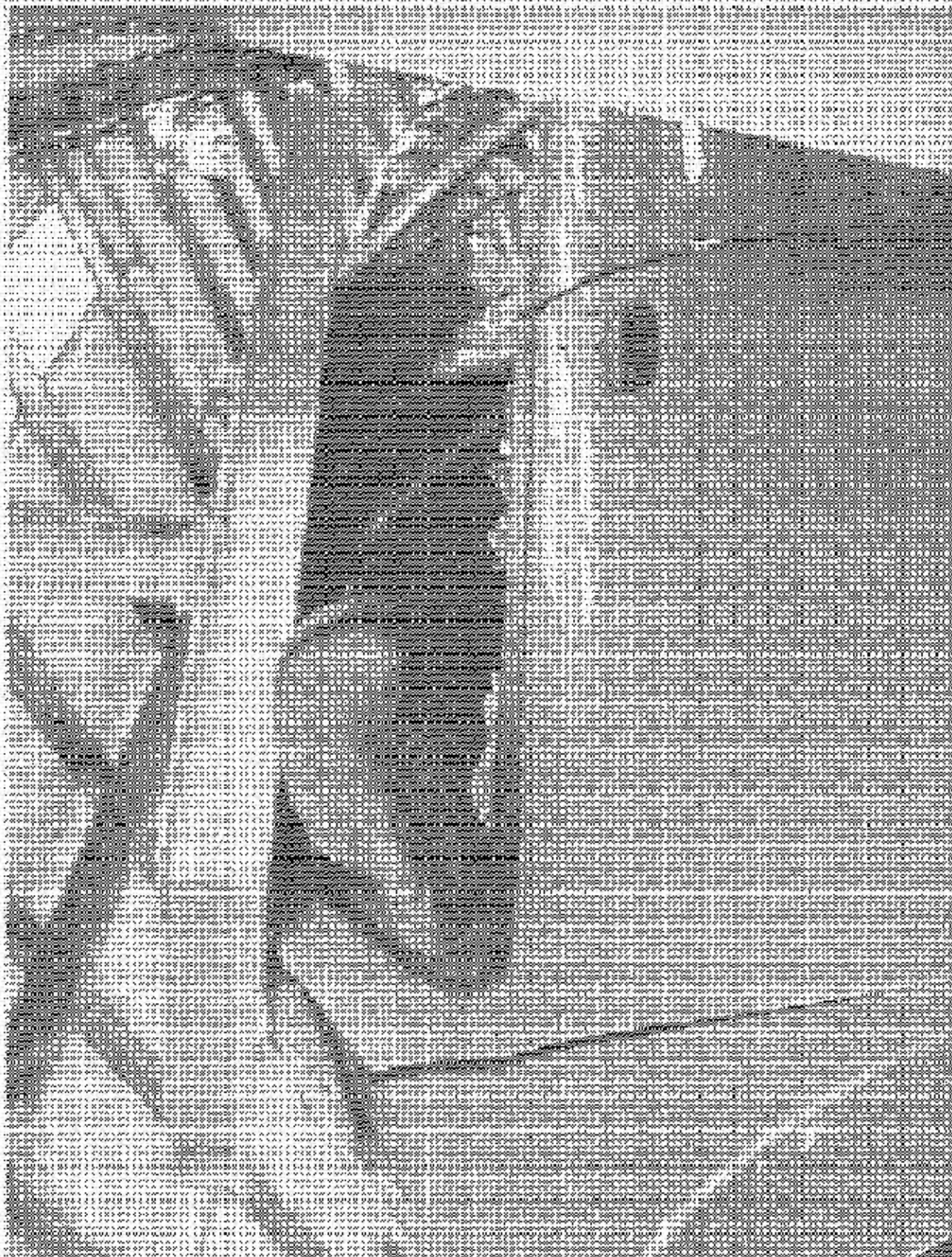


FIGURE D-24
SIDE VIEW OF LOADING DEVICE PLACED
AGAINST VEHICLE REAR AT FULL LOAD

2003 CHEVROLET TRAILBLAZER
NHTSA NO. D3010
FNUSS NO. 210

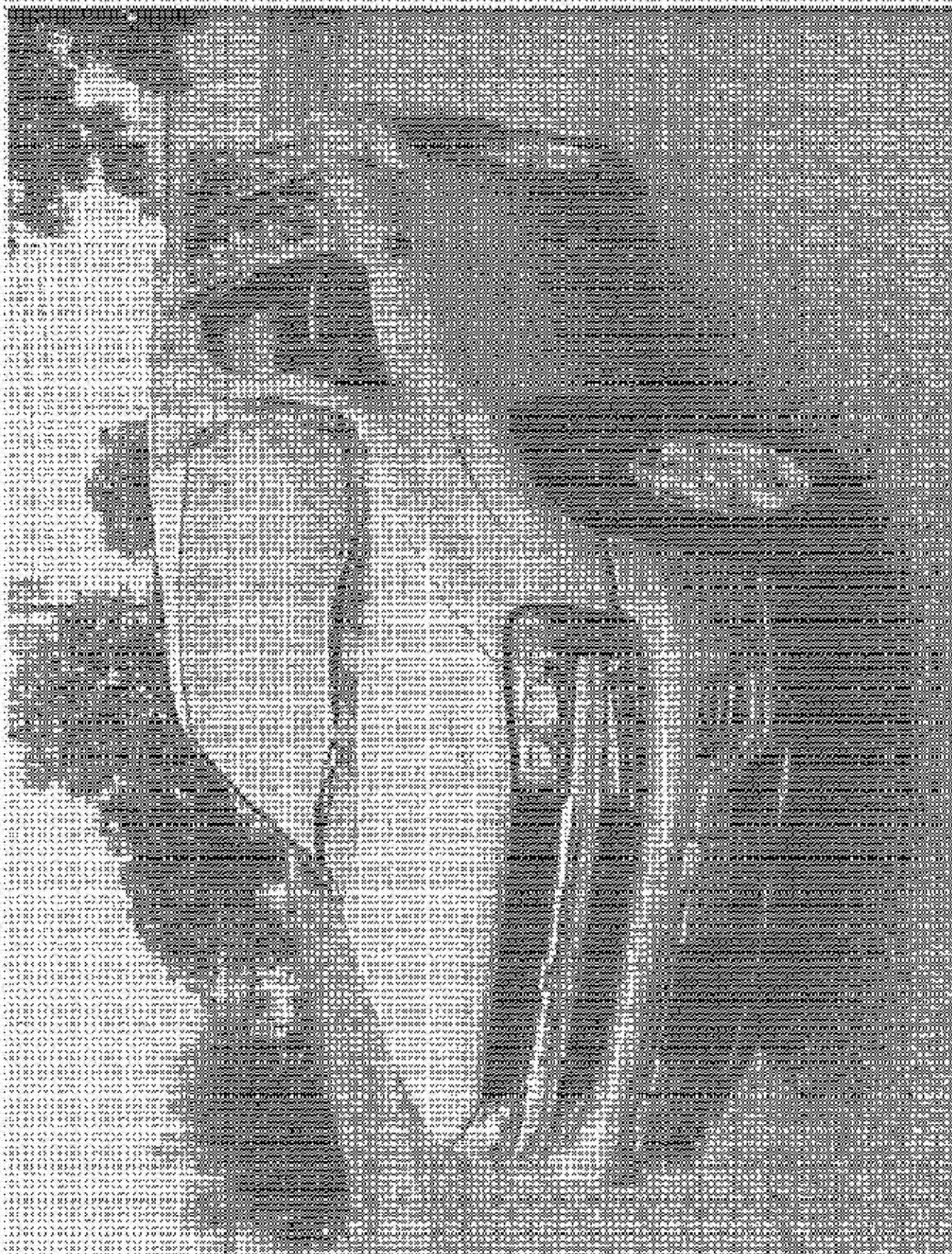


FIGURE 3-20
X. FORWARD VIEW OF VEHICLE ON TESTED
SIDE AFTER TESTING

2003 CHEVROLET TRAIL BLAZER
NHTSA NO. D20107
FAVSS NO. 216

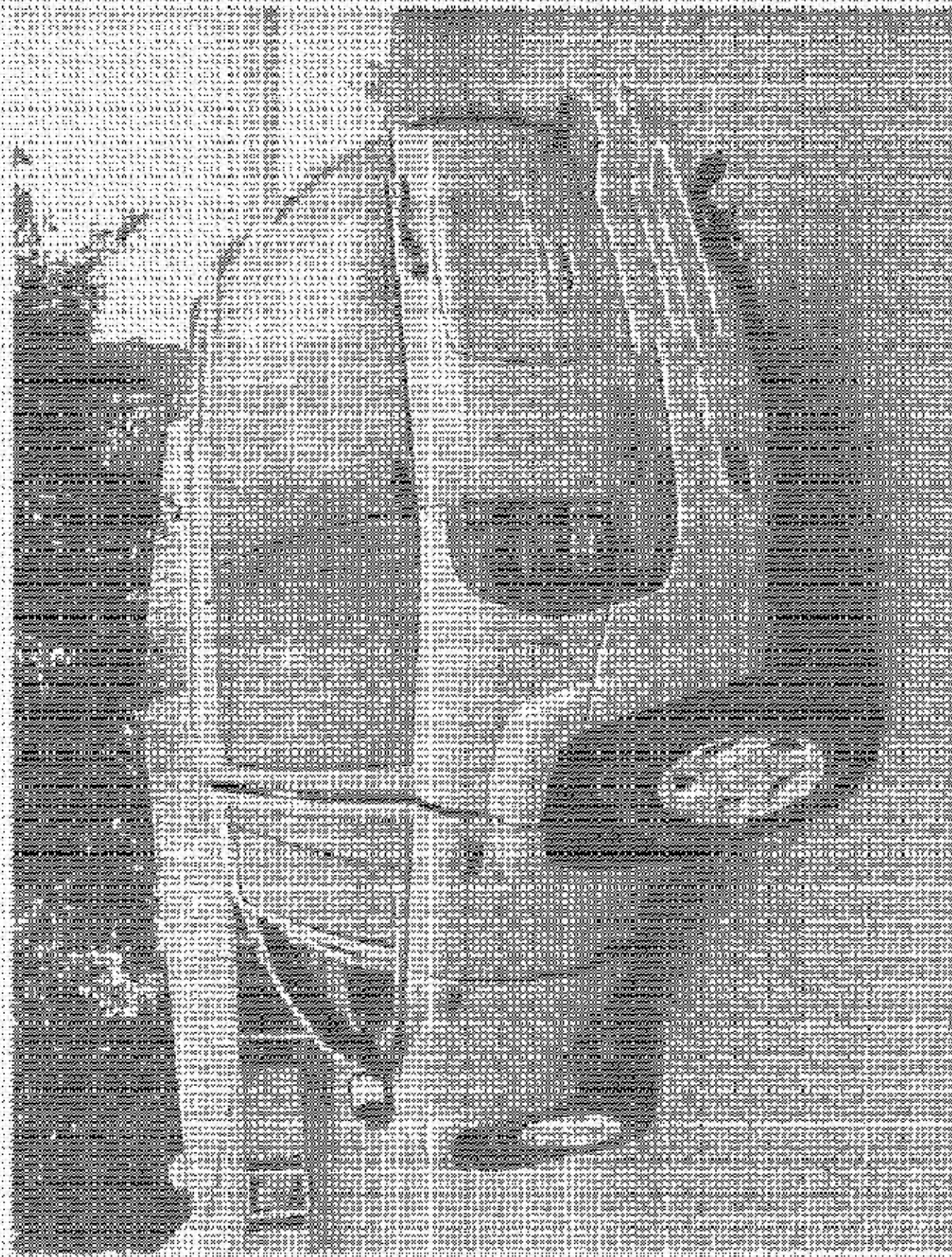
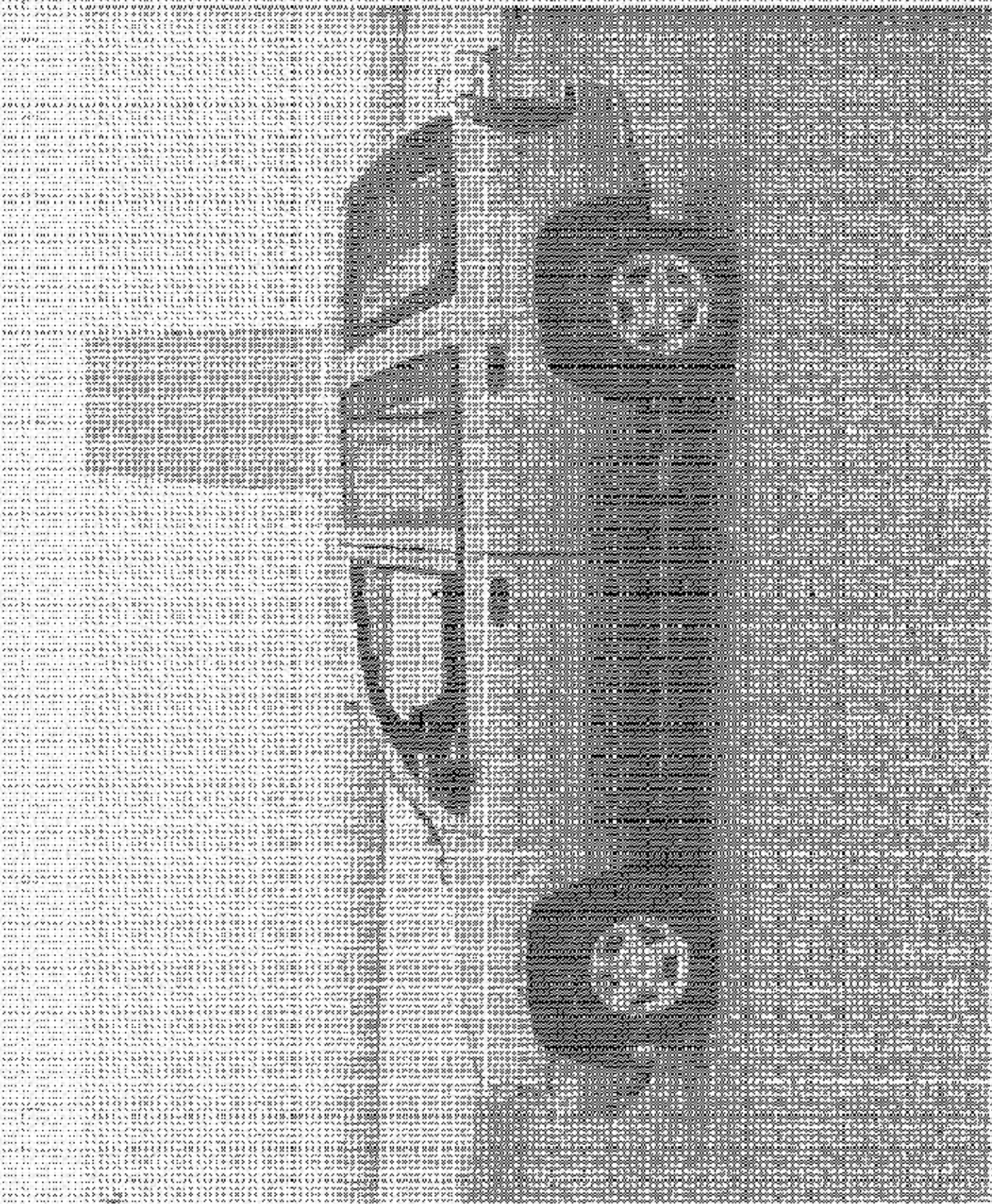


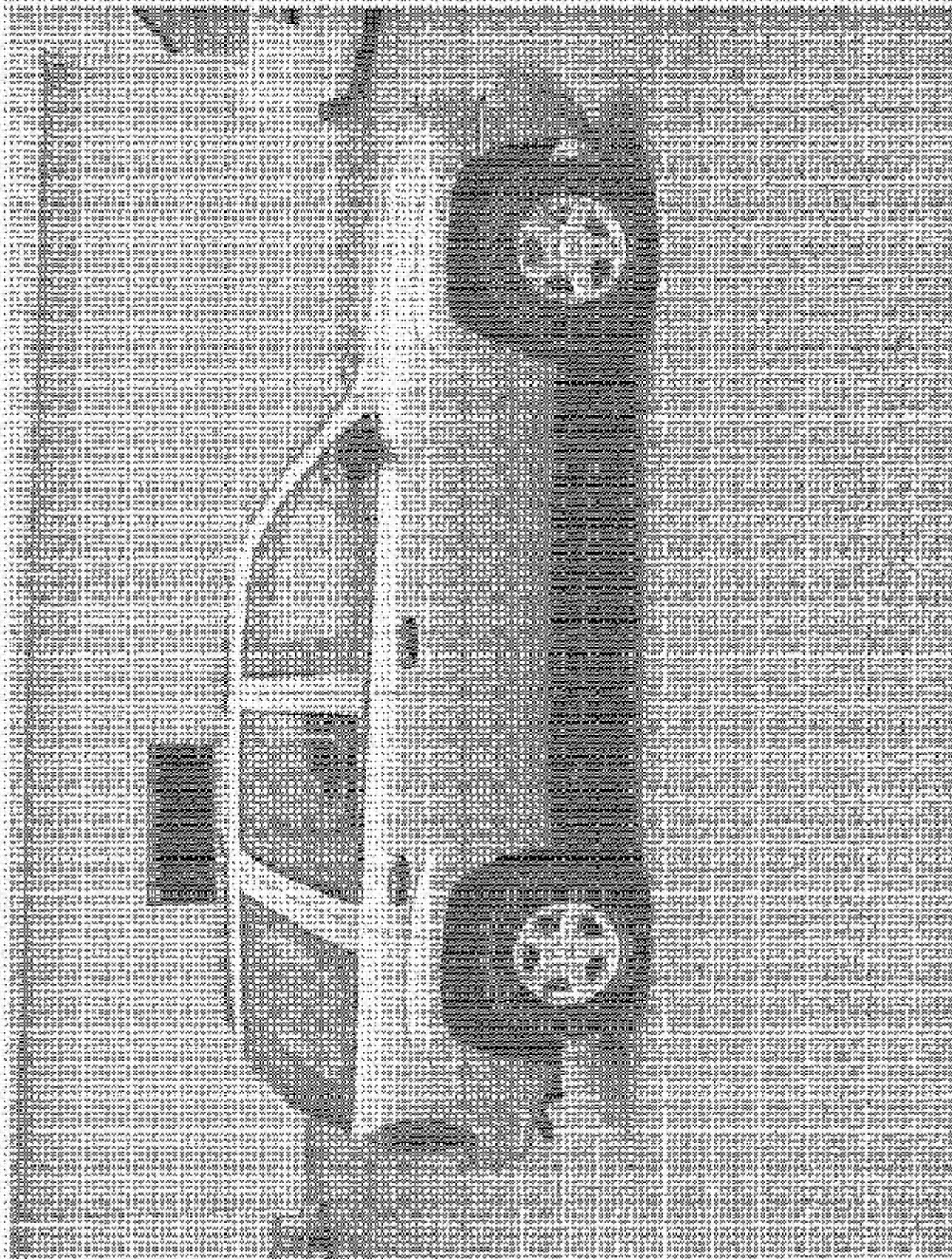
FIGURE 6-26
3/4 REAR VIEW OF VEHICLE ON TESTED
SIDE AFTER TESTING

2002 CHEVROLET BLAZER
NHTSA NO. C09107
INVEST NO. 215



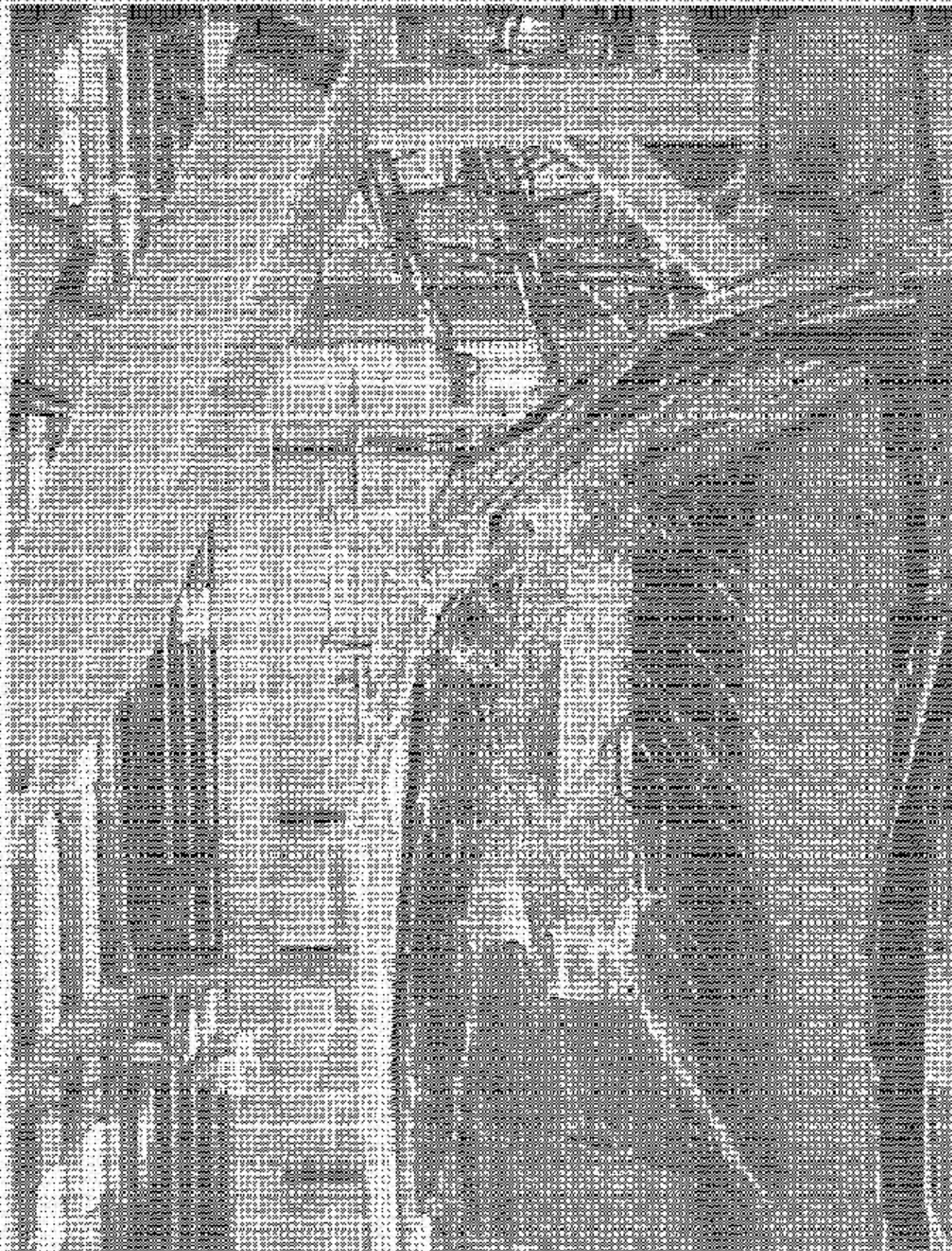
CHEVROLET TRAILBLAZER
MITSUBISHI 2000
EXCESS NO. 210

FIGURE 027
LEFT SIDE VIEW OF VEHICLE AFTER TESTING



2003 CHEVROLET TRAIL BLAZER
NHTSA NO. 020197
FMVSS NO. 216

FIGURE 3-29
RIGHT SIDE VIEW OF VEHICLE AFTER TESTING



2005 CHEVROLET TRAILBLAZER
AUTOMATIC CABIN
PASSAGE 216

FIGURE 3-29
FRONT VIEW OF VEHICLE ROOF AFTER
REMOVAL OF LOADING DEVICE



FIGURE 3-30
REAR VIEW OF VEHICLE BEFORE
REMOVAL OF LOADING DEVICE

08-06-2019 17:30

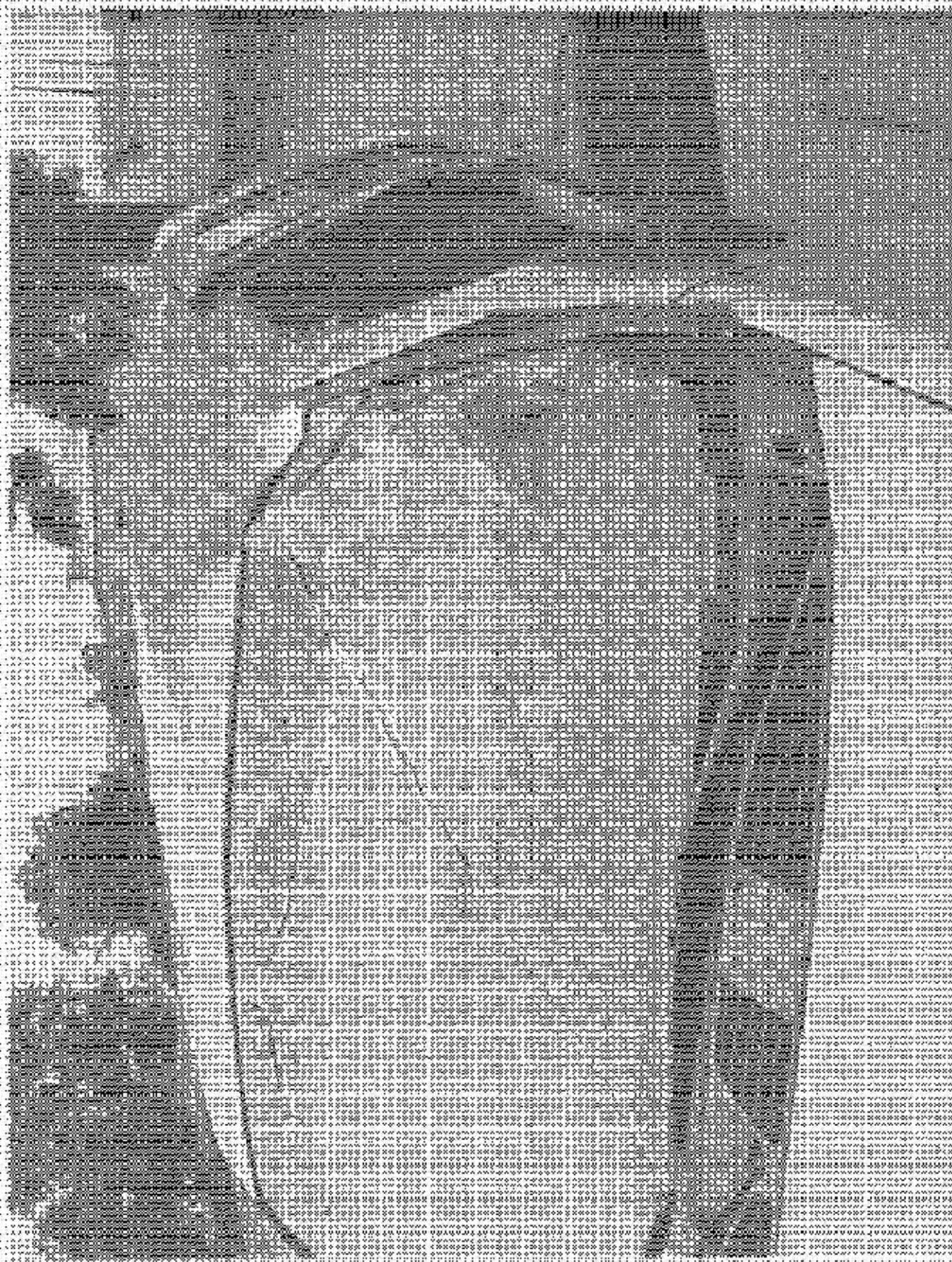


FIGURE D13
CLOSE-UP VIEW OF ROOF POSITIVE

RMCC OVERVIEW OF FRAT LILAZER
SHITBA NO. 030107
PHOTO NO. 216

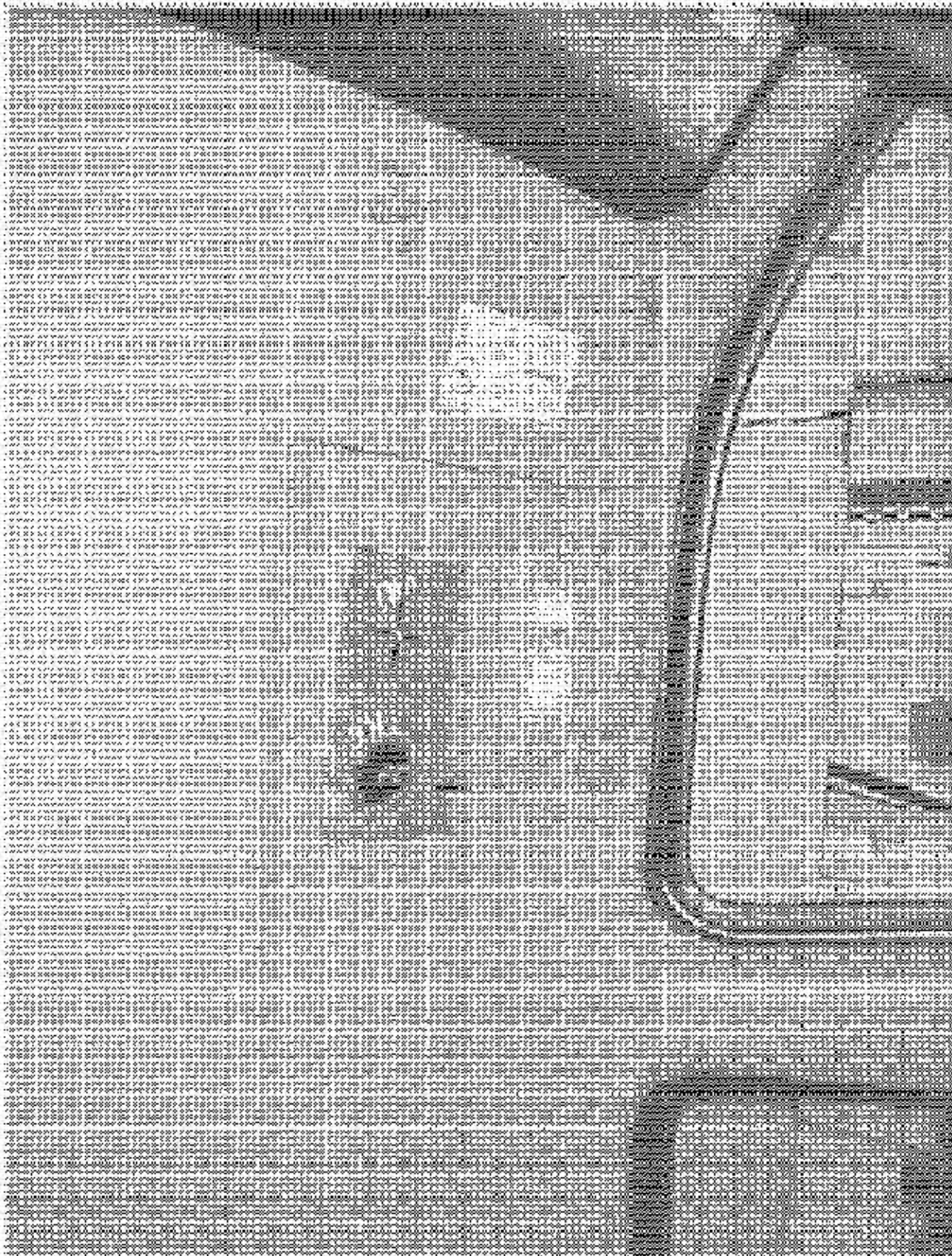


FIGURE 5-32
INTERIOR VIEW OF ROOF RAIL END

2002 CHEVROLET TRAILBLAZER
NHTSA NO. C00107
RMVSS NO. 245

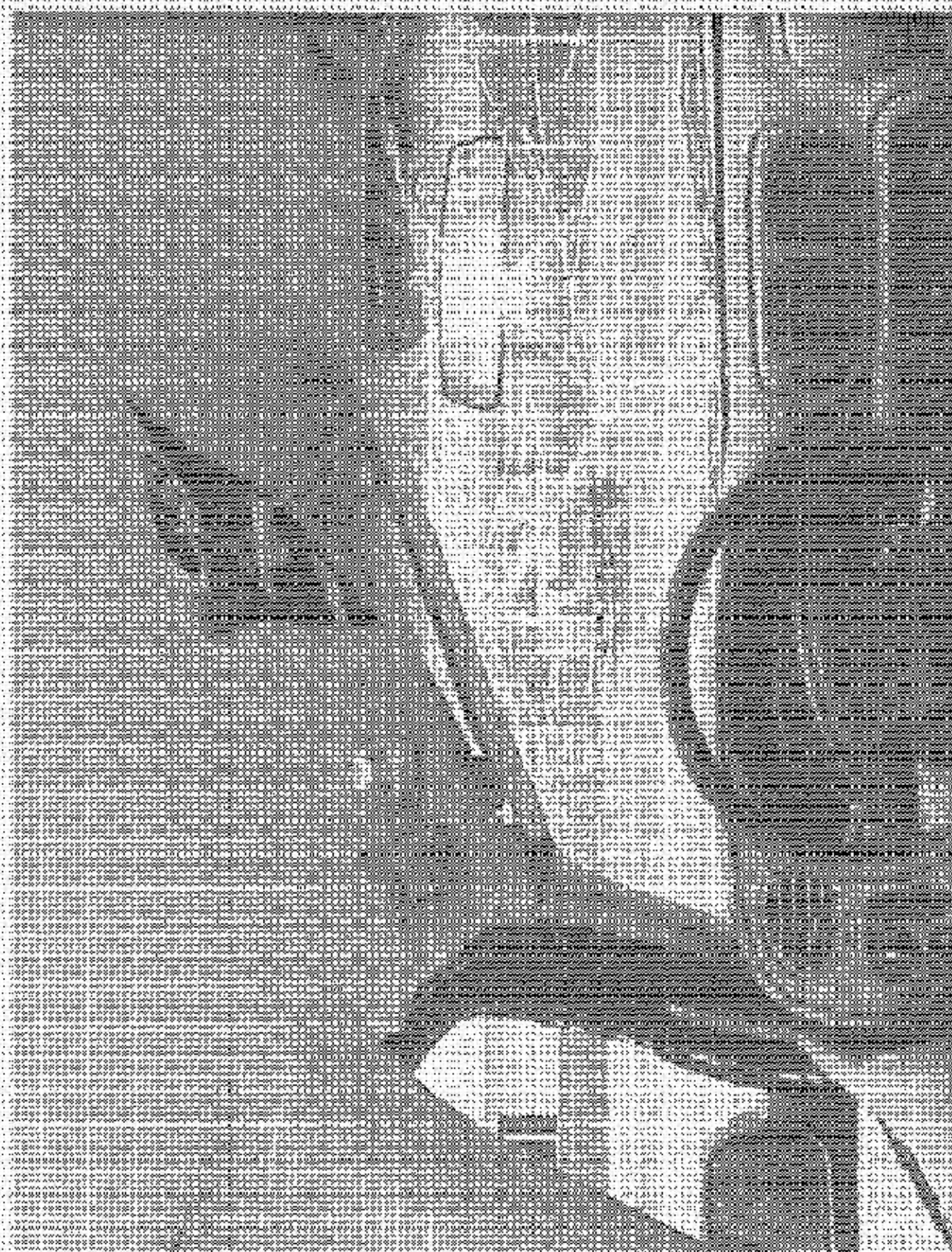


FIGURE 6-5
INTERIOR VIEW OF ROOF BOX

2002 CHEVY K1500, RALEIGH, AZ 85
NHTSA NO. C3010
RMVSS NO. 2-0

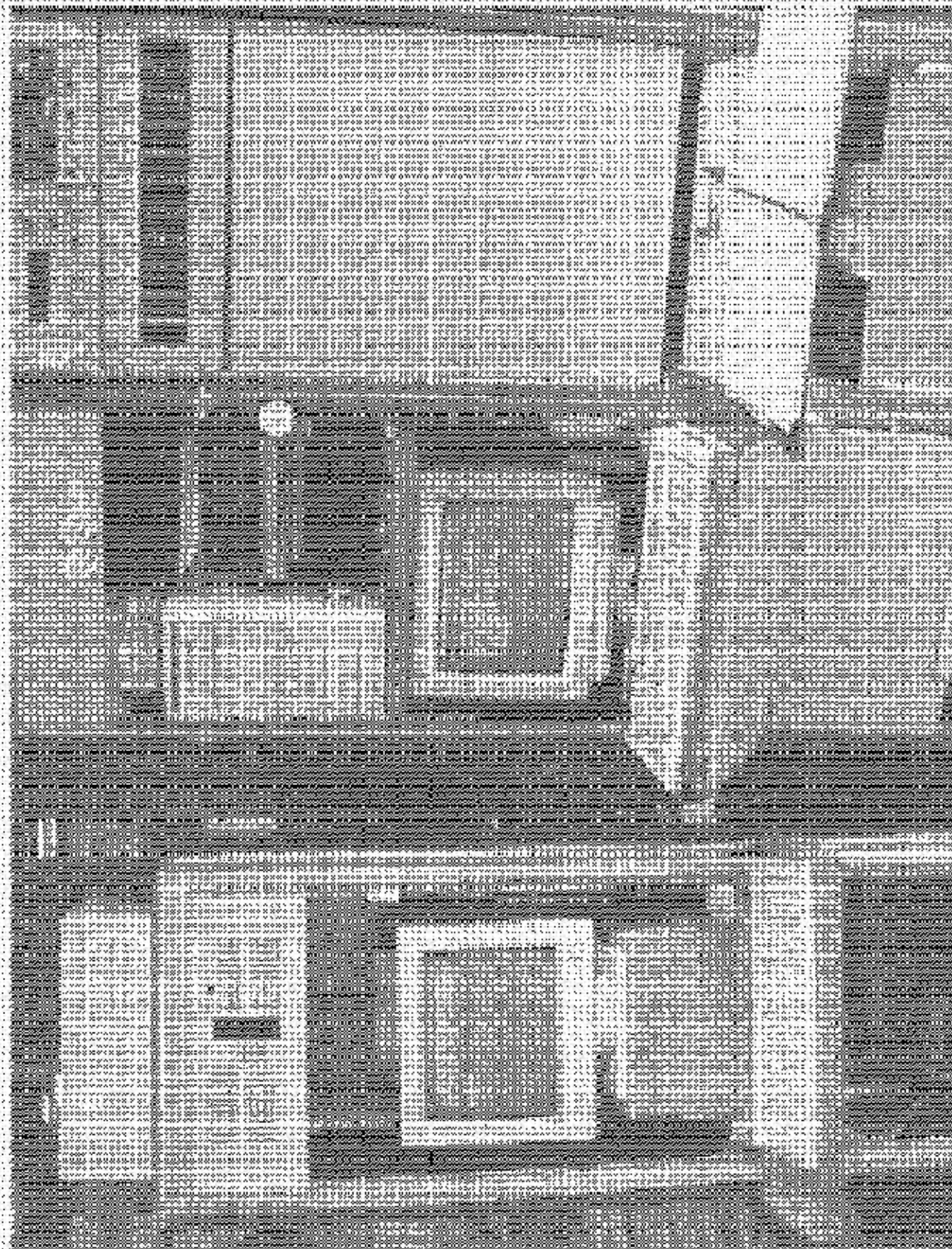


FIGURE 504
INSTRUMENTATION SET-UP

ROCK CHEMICALS, TERRAZA, AZ 8512
NITRANO 55010
PACIFIC NO. 2-6



2003 CHEVROLET TRAILBLAZER

SALE PRICE \$24,999
MSRP \$26,999

FINANCING OFFER: 0% APR FOR 36 MONTHS
ON APPROVED CREDIT. SEE DEALER FOR DETAILS.
TRADE-IN ALLOWANCE: \$1,000

2003 CHEVROLET TRAILBLAZER

SALE PRICE \$24,999

MSRP \$26,999

FINANCING OFFER: 0% APR FOR 36 MONTHS

ON APPROVED CREDIT. SEE DEALER FOR DETAILS.

TRADE-IN ALLOWANCE: \$1,000

2003 CHEVROLET TRAILBLAZER

SALE PRICE \$24,999

MSRP \$26,999

FINANCING OFFER: 0% APR FOR 36 MONTHS

ON APPROVED CREDIT. SEE DEALER FOR DETAILS.

TRADE-IN ALLOWANCE: \$1,000

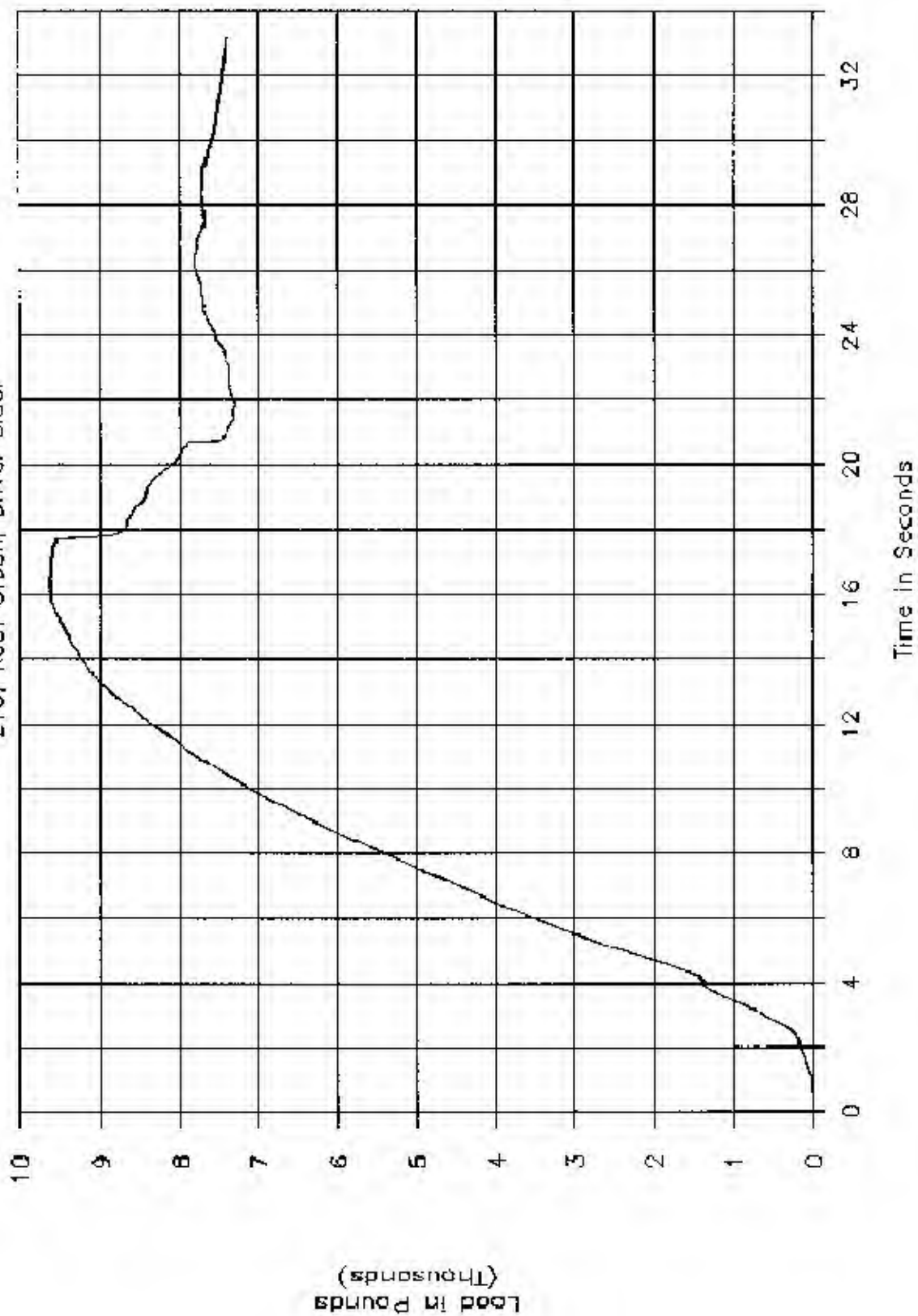
2003 CHEVROLET TRAILBLAZER
MSRP \$26,999
TRADE-IN ALLOWANCE: \$1,000

FIGURE 305
CLOSE-UP VIEW OF MEDICAL CERTIFICATION
AND TIME INFORMATION LABEL

SECTION 6
TEST PLOTS

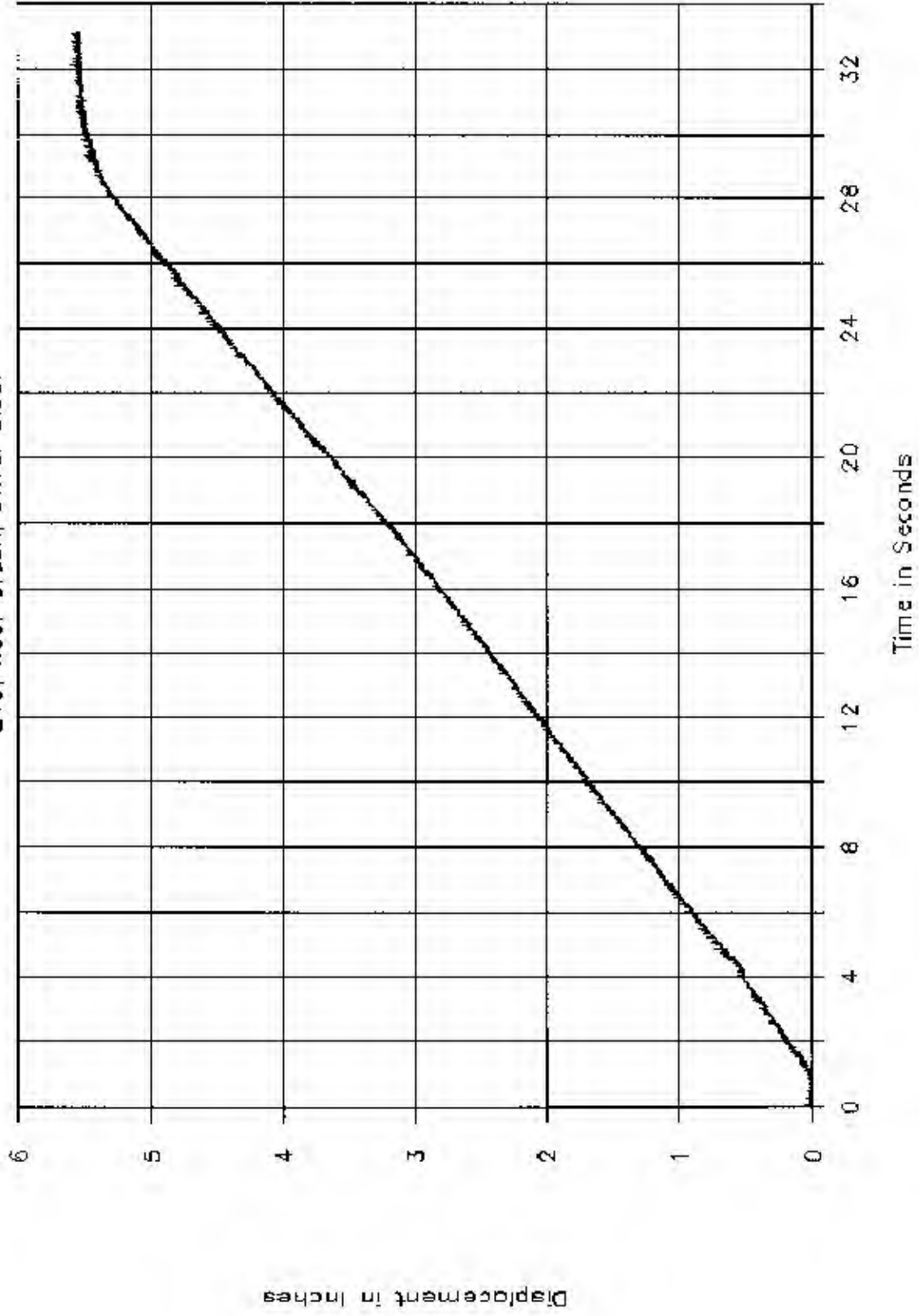
GTL 5101

216, Roof Crush, Driver Side.



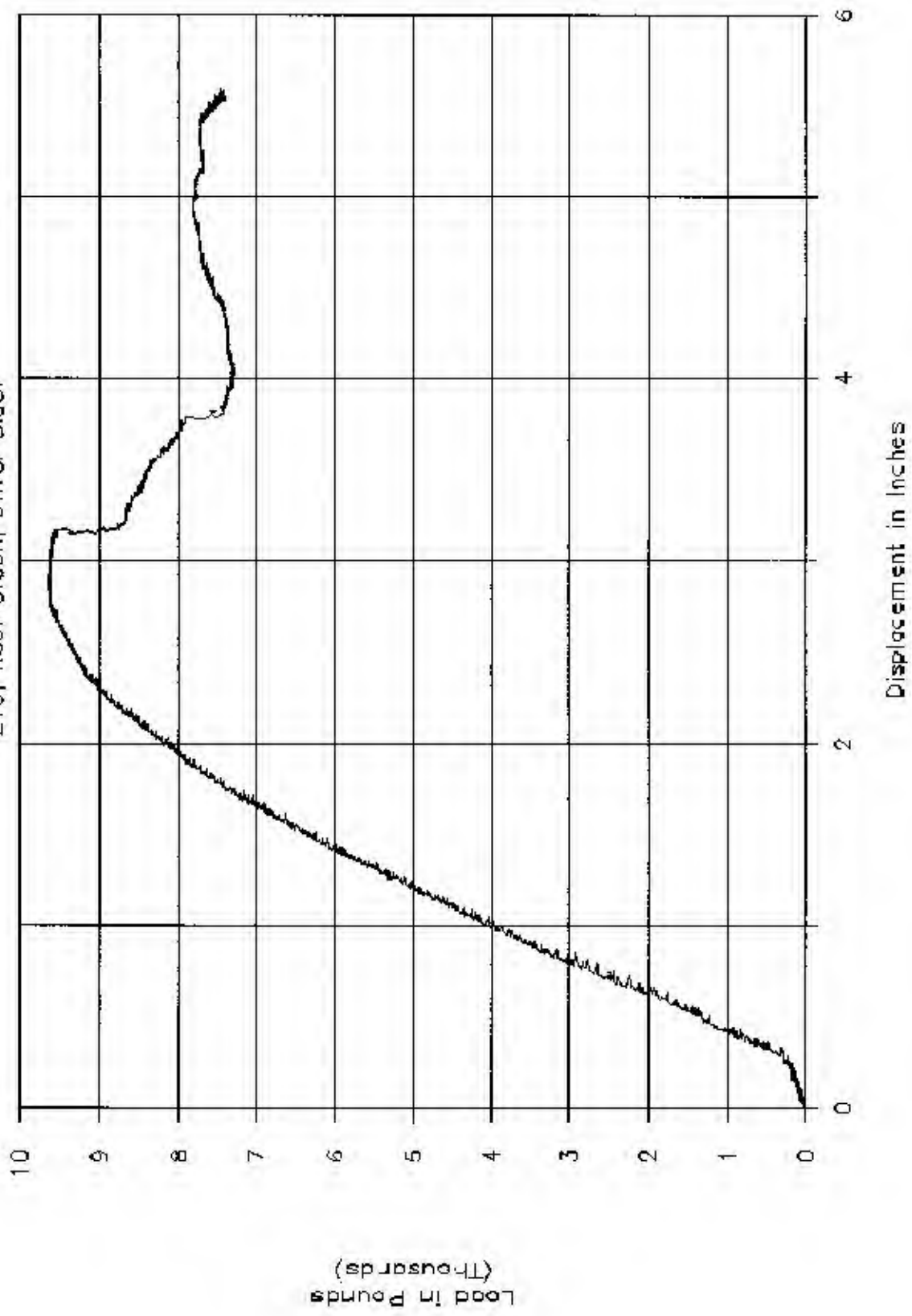
GTL 5101

216, Roof Crush, Driver Side.



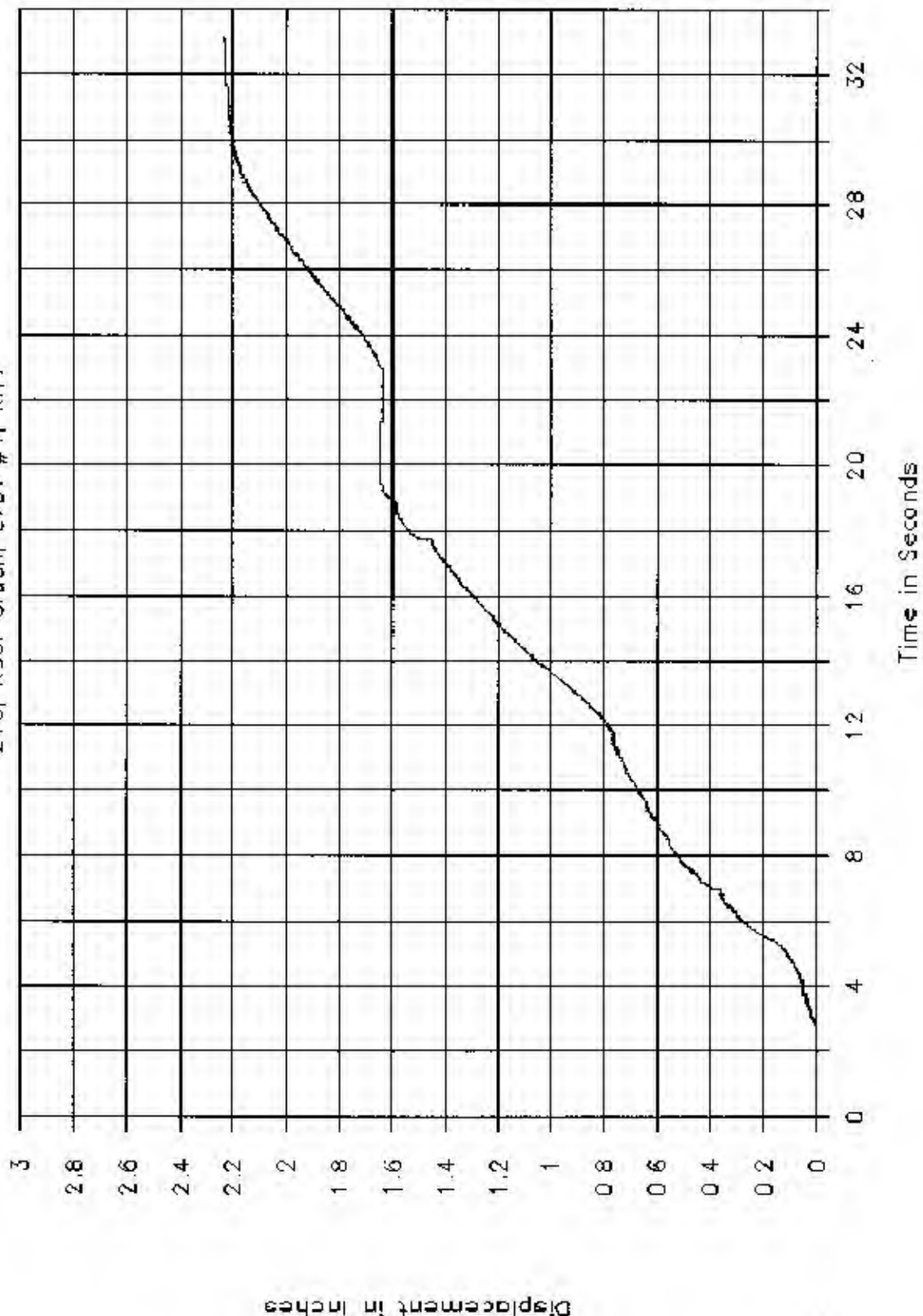
GTL 5101

216, Roof Crush, Driver Side.



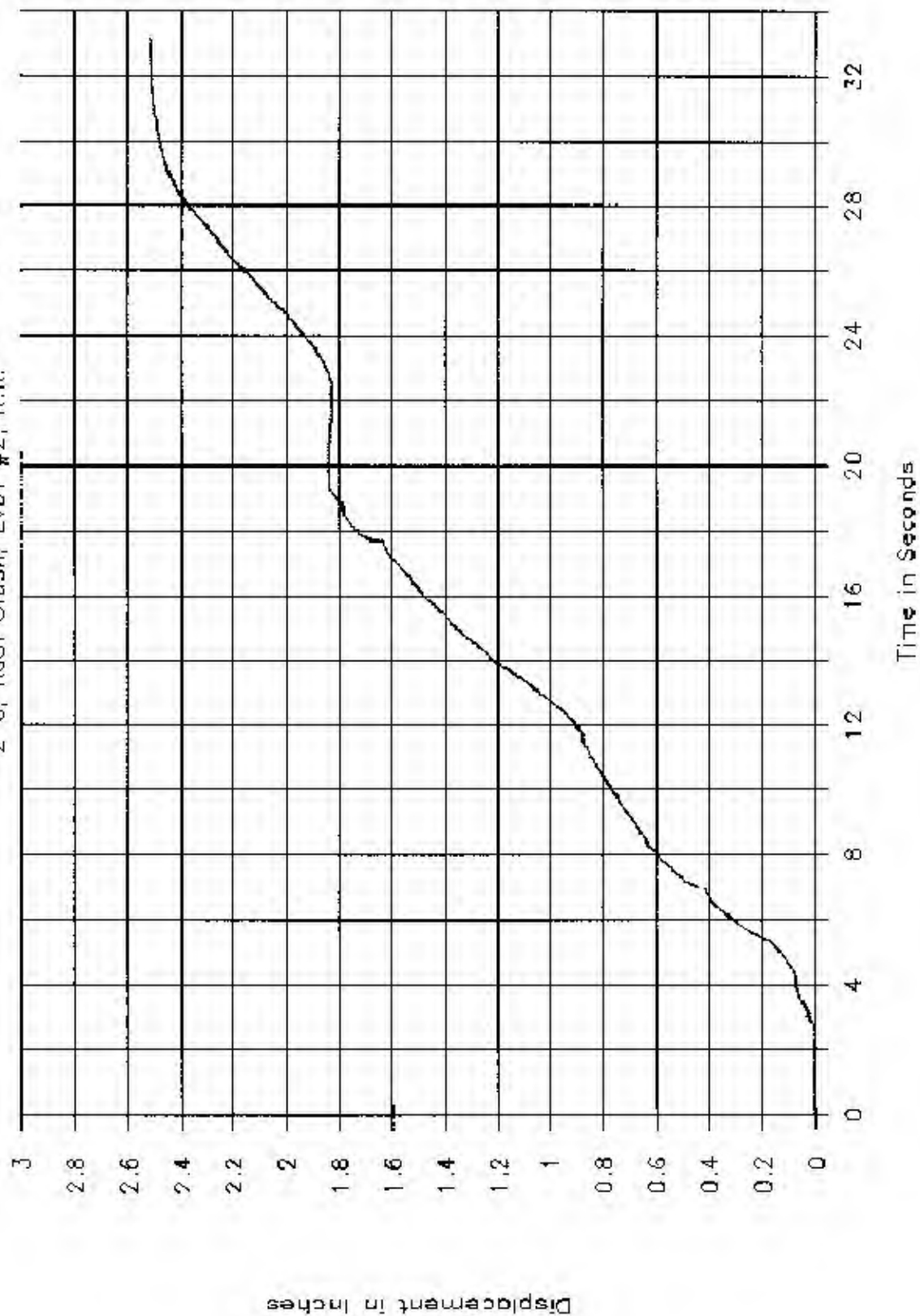
GTL 5101

215, Roof Crush, LVDT #1, R.F.



GT_ 5101

2' 6, Roof Crush, LVDT #2, R.R.



GTL 5101

216, Roof Crush, LVDT #3, L.R.

